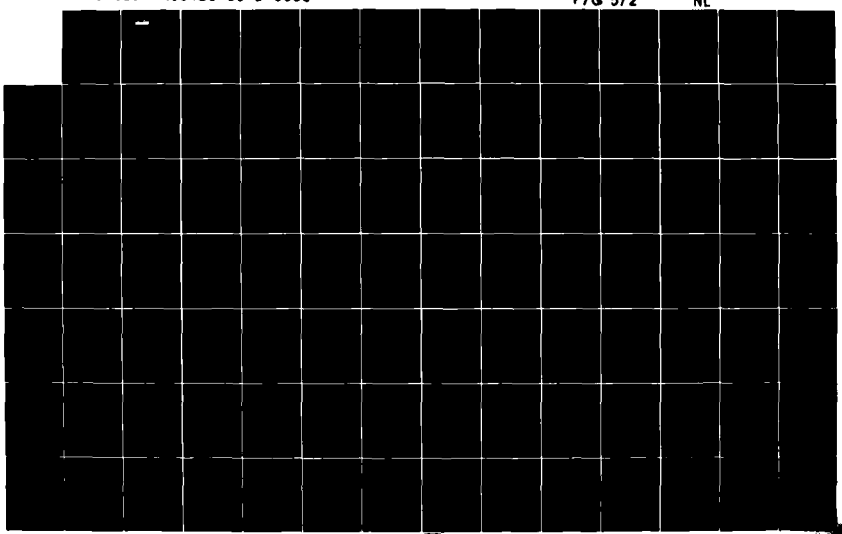
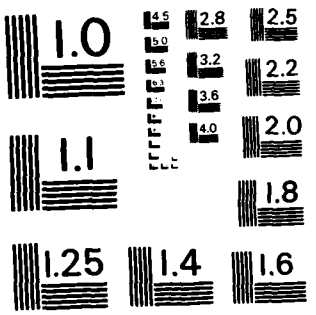
AD-A130 414 PROPOSAL AND JUSTIFICATION FOR THE ESTABLISHMENT OF AN AERONAUTICAL SYSTE..(U) ARMAMENT SYSTEMS INC ANAHEIM CA R BERNIER ET AL. OCT 82 JTCG/AS-82-SM-006 1/2

UNCLASSIFIED N00123-80-D-0033 F/G 5/2 NL





(2)

REPORT JTCG/AS-82-SM-006

PROPOSAL AND JUSTIFICATION FOR THE ESTABLISHMENT OF AN AERONAUTICAL SYSTEMS/TARGET NONNUCLEAR SURVIVABILITY/VULNERABILITY INFORMATION ANALYSIS CENTER

SURVIAC

DEVELOPED BY

THE JOINT TECHNICAL COORDINATING GROUP ON AIRCRAFT SURVIVABILITY

JTCG/AS

AND

THE JOINT TECHNICAL COORDINATING GROUP FOR MUNITIONS EFFECTIVENESS

JTCG/ME

OCTOBER 1982

FOREWORD

This report presents the results of an investigation to determine the need for a single focal point within DoD for nonnuclear aircraft survivability/vulnerability (S/V) scientific and technical information. The investigation delved into a number of alternative approaches to establishing such a focal point. The effort concentrated, however, on exploring the suitability of a long established and well-thought of mechanism, the DoD Information Analysis Center (IAC). The IAC concept, mission characteristics, and established procedures contained in DoD 5100.45 were first reviewed to determine potential applicability of the IAC concept to the problems associated with the explosion of scientific and technical information from within the nonnuclear survivability community. Upon recognizing the direct applicability of the IAC approach to S/V information, the Joint Technical Coordinating Groups on Aircraft Survivability and Munitions Effectiveness (JTCG/AS & JTCG/ME) agreed to jointly investigate in greater depth the suitability of the IAC approach. A fact-finding method was utilized, consisting of a questionnaire survey of over 4000 potential users and visits to the Information Analysis Centers. The results of the survey analysis and lessons learned during the visits provide a strong statement in favor of the establishment of an IAC for nonnuclear aircraft survivability information. This report provides sufficient detailed information on specific user needs to facilitate defining the scope of such an IAC. The tri-Service sponsors of this investigation propose the establishment, under the auspices of DoD Instruction 5100.45, of a Nonnuclear Survivability/Vulnerability Information Analysis Center to be called SURVIAC.

The investigation team gratefully acknowledges the assistance of the IAC Directors and their staffs who were interviewed, as well as the 750 potential users and/or generators of S/V information who responded to the questionnaire survey.

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: JTCG/AS-82-SM-006	2. GOVT ACCESSION NO.: AD-A130 414
3. RECIPIENT'S CATALOG NUMBER:	
4. TITLE *(and Subtitle)*: Proposal and Justification for the Establishment of an Aeronautical Systems/Target Nonnuclear Survivability/ Vulnerability Information Analysis Center–SURVIAC	5. TYPE OF REPORT & PERIOD COVERED: Final - October 1982
	6. PERFORMING ORG. REPORT NUMBER:
7. AUTHOR(s): R. Bernier, D. Mowrer, R. Horton	8. CONTRACT OR GRANT NUMBER(s): N00123-80-D-0033
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Armament Systems, Inc, 712 - F North Valley Street, Anaheim, CA 92801	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: JTCG/AS Task VA-2-15.1, PE 63232N
11. CONTROLLING OFFICE NAME AND ADDRESS: JTCG/AS Central Office, Naval Air Systems Command, Washington, D.C. 20361	12. REPORT DATE: October 1982
	13. NUMBER OF PAGES: 149
14. MONITORING AGENCY NAME & ADDRESS*(if different from Controlling Office)*: JTCG/AS Central Office, Naval Air Systems Command, Washington, D.C. 20361	15. SECURITY CLASS. *(of this report)*: UNCLASSIFIED
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE: N/A

16. DISTRIBUTION STATEMENT *(of this Report)*

Approved for public release; distribution unlimited. Statement applied October 1982.

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Nonnuclear Survivability	Information Analysis Centers	Aeronautical Systems
Survivability	Scientific and Technical Information	Aerial Targets
Vulnerability	Survivability Data Bases	Target Vulnerability
Aircraft Survivability	Vulnerability Data Bases	

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

(See Reverse)

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102-LF-014-6601

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

Naval Air Systems Command

Proposal and Justification for the Establishment of an Aeronautical Systems Nonnuclear Survivability Information Analysis Center–SURVIAC, by R. Bernier, et al., Armament Systems, Inc., Anaheim, CA, for the Joint Technical Coordinating Groups on Aircraft Survivability and Munitions Effectiveness, October 1982. 149 pp. (JTCG/AS-82-SM-006, Publication UNCLASSIFIED.)

This publication documents the results of a questionnaire/study to determine the need and justification for the establishment of a Department of Defense Information Analysis Center to collect, analyze, and disseminate scientific and technical information related to the survivability and vulnerability of aeronautical systems and other targets to nonnuclear threats. The report resulted in gaining approval for the SURVIAC.

CONTENTS

EXECUTIVE SUMMARY

SURVIAC OBJECTIVE

The objective of this investigation was to ascertain the need for a central DoD focal point for aeronautical/target nonnuclear systems survivability/vulnerability (S/V) scientific and technical information analysis and dissemination. The results have shown the clear need, and a Survivability/Vulnerability Information Analysis Center (SURVIAC) is proposed as the approach to alleviating the identified problems currently experienced with S/V information. SURVIAC will be a service-oriented center for gathering, organizing, screening, analyzing and disseminating timely and accurate nonnuclear S/V data and analysis to the Government and non-Government users in the aeronautical/target systems development community.

PROBLEM

The problems currently associated with S/V data and analysis are many. Primarily, however, it is the wide range and dispersion of users/generators that define the problem and make it clear that an urgent need exists for a SURVIAC. Extensive S/V information has been developed over the last decade by virtually every DoD research and development agency and throughout the aeronautical target community. Although each of the Services define different development and operational requirements for their systems, there remains an extremely high level of commonality in S/V information needs. The DoD can capitalize on its investment only if there is a mechanism to facilitate ready access to all critical S/V information. No such mechanism exists today. SURVIAC is being proposed as a DoD IAC within the scope of DoD Instruction 5100.45, that will be charged with the mission to gather all forms of information in the S/V discipline. The SURVIAC will enable Government and qualified industry users to obtain from a single source, responsive, up-to-date, and quantified S/V information. Additionally, standardized methods (models) for conducting aeronautical nonnuclear survivability evaluations will be available through SURVIAC.

THE IAC SOLUTION

The problem that the S/V community is experiencing with its exploding data bases is not a new one. In 1964 it became apparent to DoD that the rapid growth in scientific and technical information demanded a control mechanism. The Information Analysis Center (IAC) concept was endorsed through the development of DoD Instruction 5100.45, "Centers

for the Analysis of Scientific and Technical Information". The purpose of an IAC is to provide scientific and technical information support and services to both government and industry in a specialized technical area or for a specific mission. There are 19 DoD supported IACs. The IACs are similar in operation, but dissimilar in subject matter, services, and output. They range in specialties from technology/phenomenology, to materials development and performance, to construction engineering. Each center collects, reviews, analyzes, appraises, summarizes, stores and disseminates available information on subjects of specialized technical areas or missions of concern. These functions differentiate IACs from Technical Information Centers and Documentation Centers, i.e., Defense Technical Information Center (DTIC) and National Technical Information Service (NTIS), in that those centers simply collect, store, and redistribute technical reports and published information.

The Defense Logistics Agency (DLA) and DTIC administer and fund nine existing IACs. Ten other centers are managed by other DoD activities. Each IAC receives technical management from DoD laboratories and agencies who are leaders in the field of science and technology corresponding to the center's function.

PROPOSAL APPROACH SUMMARY

The approach utilized to determine the justification for the SURVIAC and provide a well-defined preliminary plan to established the SURVIAC is presented in Figure 1. The approach consisted of a systematic fact finding sequence to ensure the need and requirements were accurately determined.

Step 1–the need for SURVIAC evolved from numerous problems recognized by the sponsors of this proposal. These problems are shown in Step 1 (Figure 1). They include: (1) over two decades of S/V scientific and technical information development; (2) data is widely dispersed; (3) S/V data and information is highly specialized; (4) types of information are varied; (5) quality varies greatly in many cases; (6) Government and industry users are unable to stay abreast of the state-of-the-art; and most importantly, (7) there is no existing, efficient, rapid service center for S/V data and analysis. These problems impact the ability of the DoD to ensure fair, effective industrial competition in compliance with current acquisition and procurement policies.

Step 2–established a proposed mission and scope for SURVIAC. The mission covers U.S. and foreign aircraft/missiles versus nonnuclear threats. It will encompass supporting analysis and technology required for research and development, test and evaluation, and tactics development.

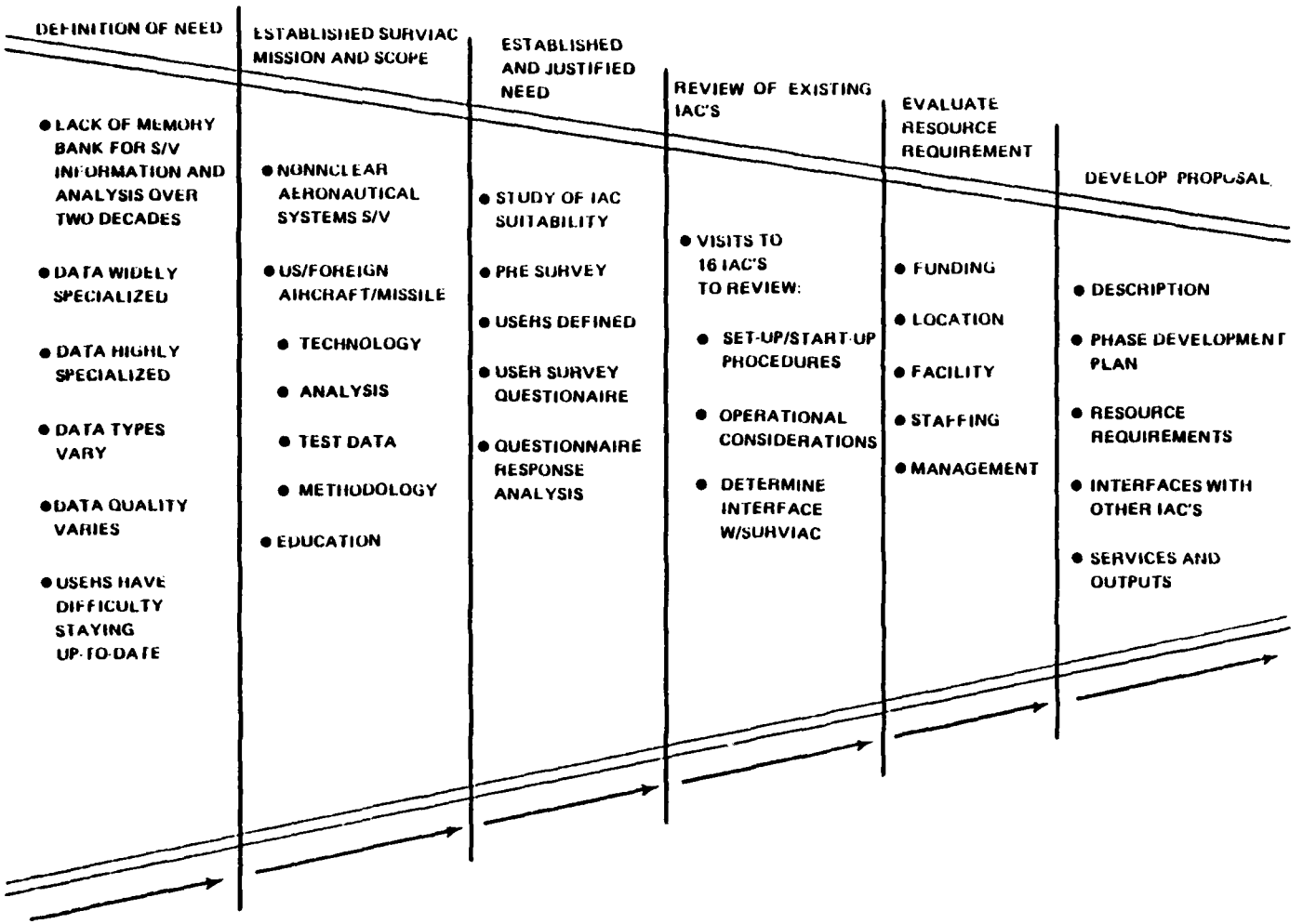


Figure 1. Proposal Approach.

Step 3–assessed and established the need for a SURVIAC. This was accomplished by conducting and evaluating surveys, interviews, and reviews of existing services within the user community (IACs, documentation centers, technical libraries, etc.). A pre-survey of key R&D managers within the government and industry user community was performed to explain the SURVIAC concept and solicit their views. The response was positive and provided justification for a broader written user survey. The written survey of potential users (4175 addressees) was conducted to verify the perceived need and further define the scope of the SURVIAC based on users' needs. The results of the written survey provided a strong endorsement and concurs in the need for establishing the SURVIAC. Response to the survey was relatively evenly distributed between Government and industry (48% and 52%, respectively). Representation by agencies was also nearly evenly distributed between Government and industry (123 and 118, respectively).

The written survey addressed the potential users' needs in great depth and solicited additional inputs where relevant. The complete survey results are analyzed and presented in Appendix A of the proposal. Responses to the basic non-technical issues are summarized in Tables 1 and 2.

TABLE 1. Need/Usage Responses.

Need/Usage Questions	Percent		
	Yes	No	Blank
• Does a need exist for a Center for S/V information ?	92	4	4
• Should it be chartered as a DoD Information Analysis Center ? (Somewhat lower due to lack of knowledge of IACs)	84	5	11
• Would the community use such a central source if available ?	88	4	8

SURVIAC, to be of use to the S/V community, must provide data and information in the most desired/requested form. To determine user needs, the survey requested respondents to rank five choices in order of preference. The results are shown in Table 3 by first and second choice percentages. Government and industry responses were virtually identical and are therefore not presented independently.

These responses clearly indicate the fundamental problems associated with S/V data today. They further provide direct user input as to the specific needs for the services SURVIAC will provide versus that available now through DTIC, NTIS, technical libraries, and other documentation sources. The services demanded by the user community can only be provided by a specialized IAC.

TABLE 2. Current User Problem

Current user problems (by rank and percent of responses)	Percent	
	Rank	Of response
• Unavailability and/or inaccessability of needed information	1	73
• Unawareness of availabile data and methodologies	2	58
• Inconvenient/incomplete format of information	3	40
• Information not oriented to needs	4	34
• Poor quality (unreliable, dated, etc.)	5	28

Note: The solicitation of write-in comments produced the identification of additional problem areas from 10% of the respondents.

Table 3. Desired Information Forms.

Desired information forms	Percent	
	1st Choice	2nd Choice
• Data with analyses	60	23
• Data with comments	38	40
• Flexibility in data formats	15	23
• Topical data sources only	10	16
• Raw data identification only	6	10

Step 4–involved fact-finding visits to 16 selected Information Analysis Centers. Center Directors and staff were interviewed by knowledgeable survivability specialists in order to:

1. Identify and detail the experience of existing IACs in performance of their function.

2. Identify potential interface requirements between SURVIAC and existing centers containing information relative to S/V.

3. Determine, based on empirical data, the critical elements of funding, manpower, set-up, and continued operation of an IAC.

Step 5–consisted of the analysis of all compiled facts, refinement of SURVIAC's scope, necessary interface with other IACs, funding and manpower requirements, location considerations, and development of the SURVIAC proposal.

BENEFITS OF A DoD SURVIAC

The establishment of a full-service DoD IAC for aeronautical/target systems nonnuclear survivability/vulnerability will provide benefits for all segments of the aeronautical/target systems development community. When fully operational this IAC will, as a minimum, accomplish the following:

1. Increase the utility and transfer of all available S/V technical information to the researchers, systems developers, managers, and ultimate users.

2. Provide a centralized source of current and readily available S/V data and analysis methods to evaluate U.S./foreign aeronautical/target systems S/V.

3. Minimize the duplication of research programs by serving as a DoD focal point for specific information on past, present, and on-going S/V related technology and evaluation programs.

4. Provide scientific and technical information analysis services in area relating to S/V technology needs.

5. Provide baselines and methods for evaluating systems S/V.

6. Promote standards in the collection, analysis, and utilization of S/V technical information and analytical tools.

7. Assist program managers and other decision makers in evaluating systems survivability.

8. Promote the use of standardized evaluation methods whenever practical.

RECOMMENDATIONS

The establishment of SURVIAC as defined herein is strongly recommended. The defined characteristics are based on the requirements of the aeronautical/target systems development community and on IAC precedents and experience. A four-phase development plan has been developed and tailored to the unique S/V discipline. Specific issues relative to the nature of S/V information, time, cost, and procedures for classified material handling have been addressed. Special emphasis is placed on the need for technical analysis/evaluation capability to support user needs. Complete justification for the following recommendation is contained in the proposal text. The following specific recommendations are made that:

1. Administrative management and funding responsibility for the SURVIAC be vested in the DLA/DTIC with technical management vested in the Steering Committees of the Joint Technical Coordinating Groups on Aircraft Survivability (JTCG/AS) and Munitions Effectiveness (JTCG/ME).

2. The SURVIAC be contractor operated and monitored by a Service component providing support to the JTCG/AS and JTCG/ME.

3. The SURVIAC be funded at the following levels starting with FY 85:

($000)

FY 85	FY 86	FY 87	FY 88
750	825	907	997

4. The initial location of SURVIAC be at Wright-Patterson Air Force Base (WPAFB), Ohio at the USAF Flight Dynamics Laboratory. This location is the present site of the JTCG/AS and JTCG/ME sponsored Combat Data Information Center (CDIC) and the Aircraft Survivability Model Repository. These two activities will be absorbed by the SURVIAC and provide the core of this new IAC. While WPAFB is considered the most suitable initial location during set-up and transition, the competing contractors may propose and justify alternate locations for the full-service SURVIAC commencing FY 85.

Implementation Plan Goals

Detailed goals are presented in the proposal text and summarized below as:

1. Pre-SURVIAC Phase - FY 83–84: Locate, collect, define, categorize, and prepare the S/V data base for computerized storage and retrieval and identification of S/V models. This will be accomplished utilizing the in-house and contract support capabilities of CDIC at WPAFB, Ohio.

2. Set-up Phase - FY 85 (Upon Contract Award): Establish computerized S/V data storage and retrieval system, user request and service procedures. Community orientation to SURVIAC services. Initiate services in order of determined priorities.

3. Start-up Phase - FY 86: Initial operation as a "Full-Service IAC". Full collection, analysis, dissemination and other user services established.

4. Full Service Continued Development - FY 87 on: Continued full utilization of extensive existing and emerging S/V information and methods to address user needs.

In summary, the need for a SURVIAC has been established. User interest is overwhelming and the potential benefits are clear. The proposal provides sufficient information to facilitate the establishment of a functional SURVIAC upon approval.

1.0 INTRODUCTION

This investigation addresses the problem of timely, responsive dissemination of lethality/vulnerability/survivability information. Warfare involves degrading enemy capabilities, and practically all military equipment is directly or indirectly intended to "kill" or degrade targets. As a corollary, equipment must be capable of performing (at least) essential functions after being attacked by enemy weapon systems. Hence, quantification of survivability/vulnerability (S/V) is an integral part of the design, development and evaluation of practically all major military equipment. The need for more and better information is critical, and the demand is increasing. The importance of S/V consideration is recognized at all decision levels up through DoD and Congress. Quantified S/V requirements are now included in most procurements, more and more explicitly. Evaluation/verification of effectiveness necessitate quantification, which requires suitable methodology and sufficient input data. R&D of materiel, as well as deployment and production, continue but too frequently without full benefit of the S/V information which has already been documented. This study investigates the problem of disseminating S/V information concerning aerial targets.

Most of the effort was dedicated to fact-finding. A Questionnaire Survey of S/V information users to ascertain their needs (Appendix A); and visits to existing Information Analysis Centers (IACs) to ascertain the adaptability of the IAC approach to the dissemination of S/V information (Appendix B).

1.1 BACKGROUND

This study was sponsored jointly by two tri-Service technical coordinating groups of the Joint Logistic Commanders (JLC): the Joint Technical Coordinating Group on Aircraft Survivability (JTCG/AS) and the Joint Technical Coordinating Group for Munitions Effectiveness (JTCG/ME).

Quantified S/V information is an essential input to design and/or evaluate the effectiveness of U.S. aircraft and missiles against potential enemy weapons, as well as U.S. guns, missiles, etc. against potential enemy aerial targets. Such information is the substance of all "trade-off" studies presented to technical and/or management decision makers at all levels.

While aircraft, missiles and other materiel differ among the three Services according to their missions, S/V problems do not differ drastically, nor do they differ fundamentally from their Soviet counterparts. While the effects of S/V alternatives must be evaluated by

uni-Service and DoD decision makers, they must also be quantified for various levels of industry decision makers. As a natural consequence, S/V methodology and input test data have been evolving for the past 40 years at many Government/contractor agencies dispersed throughout this country and elsewhere.

Such a situation is not new, nor is it unique to the S/V discipline. In fact, recognition of the tri-Service nature of S/V information led to the formation of the two JTCGs in 1969 and 1971. Numerous JTCG accomplishments were achieved for the benefit of DoD and the three Services, as well as for their industry counterparts, but the chronic problem of identifying disseminating information remains.

1.2 STATEMENT OF THE PROBLEM

In its simplest terms, the problem is how to get a variety of critical information which exists to many users who need it, when they need it, in a form that they can understand and use.

The problem is not unique to S/V, but it is complicated by the nature of the S/V discipline, which requires the integration of many different highly developed specialties of science and engineering. The scope of S/V application is also broad; it affects all military materiel at one or more stages of development and/or evaluation. Furthermore, the diversity of the "user community" is as broad as the S/V discipline and its applications. By nature, S/V information critically requires centralization, yet no central DoD "clearing house" exists at the present time.

Most S/V data is generated by Government laboratories for a variety of specific purposes, although usually such data have many other potential uses. Most S/V information is eventually documented and entered (by AD number) into the Defense Technical Information Center (DTIC). However, the mission of DTIC (essentially a large technical library), and the sheer size of its document holdings, make it virtually impossible to provide responsive service within specialized technical areas like S/V . (See Appendix C for further discussion of the information dissemination problem.)

In the recent S/V User Survey (Appendix A), the following problems were confirmed by the responders:

1. Unavailability and/or inaccessibility to needed information (checked by 73% of the responders)
2. Unawareness of available data and methodologies (58%)
3. Inconvenient/incomplete form of information (40%)
4. Information not oriented/slanted to needs (34%)
5. Poor quality information (unreliable, dated, etc.) (28%)

In summary, considerable useful S/V information exists, but it is widely dispersed and not always formally documented. Current dissemination efforts are not responsive to user needs primarily because the information is not centralized and there is no effort to analyze the information. In addition, available information is neither standardized nor authoritative enough. Because of the variety of technical specialties within S/V, and the variety of applications, most users also require analysis with the data they acquire in order to insure their validity and suitability to the intended applications.

1.3 DoD DIRECTED SOLUTION

The above problem in responsive dissemination of information is not unique to the S/V discipline. In fact, it is a common problem of many emerging technologies with "exploding" data bases. In recognition of such problems, the Office of the Under Secretary of Defense for Research and Engineering (OUSDR&E) evolved the concept of the Information Analysis Centers. At least twenty such IACs have been sponsored through the Defense Logistics Agency (DLA), and others are supported by the three individual Services. DoD Instruction 5100.45 issued on July 28, 1964 includes the following "Policy Statement".

> "A. The growth of published and unpublished scientific technical information that must be assimilated by technically-trained managers, scientists, and engineers has resulted in ever-expanding requirements for organized screening, filtering and reduction of such information to insure that those who need it are provided with the best, the most pertinent, and the most succinct information. The Department of Defense, after considering the advantages and disadvantages of central review of pertinent information, endorses further development of the information analysis center concept, with special emphasis on the evaluation aspects of the concept."

In the latest (26 May 1982) draft revision of 5100.45, the DoD policy is reiterated as follows:

> "The Department of Defense endorses further development of the Information Analysis Center concept, with special emphasis on the evaluation aspects of the concept."

Hence, a full-service Information Analysis Center (SURVIAC), as endorsed by DoD Instruction 5100.45, is proposed herein as the logical, precedented solution to the current problem in disseminating responsive S/V information.

1.4 STUDY APPROACH

This study provides the basis for developing a proposal to DoD, OUSDR&E for the establishment of a Survivability/Vulnerability Information Analysis Center (SURVIAC). The approach to determine the need and to provide a plan for its establishment consisted of the following structured sequence.

Step 1 involved assessment of the current JTCG/AS and JTCG/ME efforts in the collection, standardization and dissemination of S/V data and methodology. While these tri-Service joint groups identified common S/V problems and sponsored projects to fill technical gaps, their current resources (or Missions) are insufficient to meet the many various needs of DoD and all its contractors for the assessment of emerging systems. Such a demand has evolved from:

1. Broad acceptance of survivability as a design requirement and discipline at Congressional levels downward.

2. Loss of data and suffering quality in the remainder, due to lack of a centralized mission-oriented repository.

3. No existing efficient and rapid service center for S/V data and its analysis.

4. DoD procurements that encourage multi-year contracts and increased industrial competition.

5. The nature of the information (i.e., highly specialized, numerous specialties, widely dispersed sources, variations in quality, etc.) and the consequent difficulty for users to maintain the needed level of proficiency or stay abreast of the state-of-the-art.

Step 2 established a proposed *Mission and Scope for* SURVIAC, as shown in Appendix A. The Mission covers U.S./foreign aircraft/missiles versus nonnuclear threats as well as supporting analysis and technology required for research, development test and evaluation, and tactics development.

Step 3 involved further inquiries with key managers within the Army (ASEPM), Air Force (AFWAL and ASD), Navy (NAVAIRSYSCOM, NRL, NWC), and contractors to explain the SURVIAC concept and solicit their views. The responses were positive and provided justification for a broader user survey.

Step 4 was a broad survey of the S/V community (over 4,000) to verify the indicated need and to define the desired SURVIAC Scope as the solution. The questionnaire response was outstanding, with a strong endorsement for the proposed SURVIAC, by Government agencies as well as defense contractors. The results were analyzed in detail and are presented as Appendix A.

Step 5 involved fact-finding visits to (16) selected IACs. Center Directors and Assistant Directors were interviewed by knowledgeable survivability specialists in order to:

1. Identify S/V information that is already available to users at these centers, and to define the technical interfaces of the existing IACs with the proposed SURVIAC.

2. Identify and detail the experience of existing IACs in disseminating specialized technical information which might be applicable/adaptable to the proposed SURVIAC set-up and continued operation.

The final step in this study approach was the analysis of all the compiled facts, and the presentation of the SURVIAC plan and recommendations contained in this report.

1.5 PURPOSE OF THIS REPORT

The problem, i.e., responsive dissemination of S/V information, has been apparent for some time. The impact of this problem on research/acquisition programs is becoming potentially more serious. The most promising solution is equally apparent. This study identifies the unique characteristics of the S/V discipline, the accumulated information and the variety of its uses. Most of the investigative effort involved confirmation of user needs (i.e., the Questionnaire Survey (Appendix A)), and the adaptability of the IAC concept to S/V information (i.e., interviews of IAC Directors (Appendix B)). The scope and required resources for a proposed full-service SURVIAC are defined, and a plan for its implementation is submitted.

2.0 DETERMINATION OF NEED

2.1 WHAT IS S/V INFORMATION ?

In general, S/V information comprises (aerial) target data, (nonnuclear) threat data and methodology. These basic elements of S/V information are needed to quantify lethality, vulnerability, survivability for comparative evaluation of system and/or cost effectiveness at many levels of design, development, procurement, deployment, modification, etc. S/V requires a variety of simple and complex mathematical models, and all the input data which the models require to quantify a wide range of design and/or cost "trade-offs", from which to make a wide range of decisions. Such decisions range from selection of the armor thickness/material or the size of warhead fragments by a design engineer on up to the selection of major system procurements by the Secretary of Defense.

Nonnuclear threats to foreign and/or domestic aerial targets include chemical and biological weapons, high-energy laser (HEL) and other directed energy weapons, as well as all types of ballistic projectiles from guns and/or warheads, which can "kill" and/or degrade performance. Aerial targets include all types of aircraft fixed or rotary winged, and missiles without pilots, guided or unguided. It also includes crashworthiness and some natural/environmental phenomena. Hence, for domestic threats and targets, S/V information includes structural and functional descriptions and other technical data from the designers/manufacturers/users; and comparable technical and other intelligence data for foreign threats and targets.

At least conceptually, the S/V discipline can be divided into two parts: susceptibility to detection, acquisition, and "hit"; and vulnerability given a hit and/or damage. A variety of meaningful "kills" has been defined (arbitrarily) to categorize target degradation in terms

of time and/or mission (e.g., KK, K, A, B, C, M, etc.); and some have been evaluated traditionally for many threat/target combinations.

Aerial targets are normally "killed" by catastrophic structural damage, fire, and/or damage to critical functional components. Hence, vulnerability information includes the whole variety of damage test data: i.e., structural response to blast pressures, fuel fire ignition/prevention, penetration, perforation, and damage by single or multiple projectiles/fragments, blast/fragmentation combination effects (of small shell), controlled damage of dynamic components (e.g., running engines), failure analyses of flight control and other critical components, etc., etc. Each new threat/target combination introduces some new vulnerability/vulnerability reduction feature, which requires additional test data. However, total target vulnerability is synthesized from the vulnerability data on all the systems and components, most of which are common to many threat/target situations. Hence, such information should be disseminated for other DoD users, provided it is properly analyzed to insure the validity of a new application. Vulnerability information also included actual combat damage data, when it is available (and judged to be relevant).

In addition to vulnerability, the S/V discipline also includes susceptibility of (aerial) targets to detection, acquisition and/or "hit", by sophisticated (and unsophisticated) guns and guided missiles—including targets with countermeasures and missiles with counter-countermeasures. Hence, S/V information includes visual and acoustic detection, as well as detection and/or acquisition by radar, millimeter wave, laser, infrared, ultra-violet, electro-optic, etc. means/devices—each of which is uniquely quantified. While some of these technologies are sufficiently sophisticated and specialized to warrant separate IACs (e.g., IRIA, GACIAC), the integration of such information for S/V evaluations requires coordination.

In summary, it is readily apparent that S/V information includes a large variety of specialized information—which is not presently standardized sufficiently for the benefit of many potential users.

2.2 WHAT IS AVAILABLE AND WHERE ?

Although dispersed, some of the information is available in all the S/V categories discussed in the previous paragraph. As mentioned previously, DTIC is the largest source of technical data for the DoD and its contractors, but unfortunately its collection is too large and too broad in scope to serve the users of specialized data. Similarly, the National Technical Information Service (NTIS) is even broader in scope, but restricted to unclassified information. Unfortunately, detailed up-to-date S/V information is mostly classified.

The IACs are specifically intended to disseminate specialized technical data, but none exists to provide data specifically in the field of nonnuclear S/V. The Defense Atomic Support Agency Information Analysis Center (DASIAC) evidently provides sufficient information service to meet the user needs for classified or unclassified nuclear S/V data, but no comparable center exists for focal point to integrate nuclear and nonnuclear considerations on any given material to be designed or evaluated. The Tactical Weapon Guidance and

Control Information Analysis Center collects and disseminates considerable information which is relevant and necessary to S/V users, but it is not primarily oriented to serve the S/V users. Similarly, the Infrared Information and Analysis Center (IRIA) addresses IR (and other) data relevant to S/V, hence its interface and potential service (to S/V) are extremely limited. The Combat Data Information Center (DCIC) is primarily oriented to collect aircraft and other combat data, but as currently constituted it is not an IAC, and its current mission scope (and resources) are too restrictive to meet the major demands for complete or general S/V information. Two centers, RAC and DACS provide reliability analyzed information, which is sometimes helpful in S/V, but the interface is minor and the reliability discipline is too broad in itself. Eight of the other IACs (PLASTEC, TEPIAC, MCIC, MPDC, MMCIAC, NTIAC, CPIA, and SVIC) provide responsive service to DoD and its contractors, primarily on material properties and other highly specialized data which is essential to designers. Unfortunately the information overlaps, and its utility in S/V evaluation is indirect and marginal. The material properties most relevant to S/V involve armor penetration by fragments and projectiles; such information is collected, analyzed and disseminated primarily by the Army Materials and Mechanics Center (AMMRC) and other Service Agencies (not by the IACs).

The Air Force, Army, Navy and FAA each maintain relatively large Flight Safety Centers (i.e., Norton AFB, Fort Rucker, Norfolk) but, by Mission all of them exclude combat damage related incidents. While such information is occasionally useful to S/V evaluation, it represents a minor input to overall required data.

Technical (and other) intelligance data, including threat definition, is a very significant input to S/V consideration and evaluation. Necessarily most such information is classified, with explicit responsibilities assigned to designated intelligence agencies: i.e., FTD, NISC, FSTC, DIA, CIA, et al. However, most of the projectile/weapon/target characteristics required by vulnerability analysts are unclassified. Key characteristics of newer material are frequently classified, but available to the DoD and contractor users with appropriate clearance and need-to-know. Classification, need-to-know, and other data restrictions (for Government use only or proprietary rights) have been cited by many contractors as problems in data accessibility. SURVIAC is not intended to bypass any legitimate data restrictions. On the contrary, it is believed that SURVIAC would greatly enhance consistency within DoD in the interpretation and standardization of necessary restrictions, and thereby ease the flow of available data to those who need it to support DoD.

The key element of S/V data is the target component damage data, most of which has been acquired by (expensive) empirical tests conducted at Government laboratories (e.g., USABRL, USAFFDL, NWC and others). The vulnerability of new aircraft/missile targets to various (old and new) projectiles/threats is usually synthesized from available component vulnerability data. Unfortunately, such data has been acquired over the past 40 years at widely dispersed installations. Few, if any, of the DoD/contractor users are aware of all the available information which might be pertinent to their "apparently new" problems. Such inequities in the use of available Government data degrade fairness in competition, and also lead to conflicting estimates by different Government agencies. Herein lies the strongest need and justification for a center such as SURVIAC. Consistent blast, fire, penetration,

and other basic damage data needs to be available to all S/V evaluators, in terms of component kill probabilities, or in other forms as they apply to the synthesis of vulnerability estimates for new or old target/projectile combinations.

In principle, the JTCG's are dedicated to this goal; however, they are limited by resources/missions. They have been somewhat successful though. For example, the Joint Munitions Effectiveness Manuals (JMEMs) and other publications by the JTCG/ME are utilized by many S/V users. Similarly, the JTCG/AS through its subgroups and sponsored documents, have resolved technical conflicts in S/V data and methodology. However, most of the vulnerability data on record has been generated at one time or another by the separate R&D elements of the three Services (with the constant danger of duplication). Unfortunately, the distribution of such data has not been and is not consistent. Although most of the documented information eventually enters the DTIC/NTIS systems, some critical data are not formally documented, and some agencies do not utilize DTIC/NTIS. As a result, not every user has equal access to Government data according to his need (for DoD support).

The synthesis of component vulnerability data into vulnerability estimates of whole aircraft/missiles also requires physical and functional descriptive data of such targets. Original sources of such information are the aircraft/missile designers for domestic targets, and technical intelligence for foreign targets. For new and/or competitive material, this can involve proprietary restrictions (or comparable intelligence restrictions on foreign material). Nevertheless the majority of such information is not sensitive and should not be restricted for S/V purposes. A focal point like SURVIAC could alleviate many problems in this area (and their serious consequences) through consistent interpretation of legitimate restrictions and release of insensitive available data.

Given target vulnerability estimates, the next step in evaluation normally involves methodology. Modern computer technology has encouraged the proliferation of survivability/effectiveness models—within and outside Government evaluation agencies. As a result, there exists a real risk in decisions based on methodology artificial differences rather than significant factual differences. Although model selection/development can be "rigged for selfish purposes", most developed independently for legitimately different purposes. Justification for their continued use frequently degenerates to the "not-invented-here" syndrome. In fact, users as a whole (especially decision makers) have continued to request standard models for similar evaluations. A JTCG/AS methodology repository was recently established (at Battelle, technically monitored by USAF) but the dissemination of "standard" models (and standard input data) to all appropriate users, hinges upon designation of a recognized focal point.

Nonnuclear S/V involves threats other than ballistics (shell, warheads, fragments, etc.). It also includes directed energy weapons systems such as high-energy lasers, chemical/biological agents, and a few other special threats. Since the HEL weapons are newer, less data has been accumulated. But even in such a new area, data dispersal and availability to users is already becoming a problem, as well as the means of evaluating comparability with traditional ballistic threats/weapons. As for CB effects, data generation has been localized within specialized agencies (e.g., the Army Chemical Warfare community). However,

dissemination of available data to S/V users presents a slightly different problem. S/V quantification involves parameters and methods which are totally different from other more conventional threats. Most S/V data users are traditionally familiar with ballistic threats, but many are not aware of the data/methodology required to evaluate chemical/biological S/V or effectiveness. While such information may be sufficiently centralized, many users are not familiar with its sources. Furthermore, as in the case of nuclear effects, total S/V evaluation of given aerial targets requires integration of all threat effects, and methodology comparability for all threats.

The previous paragraphs discuss available data to evaluate vulnerability of target/threat combinations, but S/V also includes susceptibility to hit/damage, which includes detectability, acquisition, countermeasures, and counter-countermeasures. The S/V data availability status in the sophisticated technologies is comparable to that of vulnerability information. If anything, these technologies are more complex, more sophisticated and more restrictive.

In summary, it is apparent that:

1. S/V information includes a large variety of technical specialties.
2. Relevant data is available in all the various specialties of S/V, but
3. The data has been accumulated over 40 years at many diverse agencies/locations.
4. There is no central repository for all S/V data, or its specialties in most cases.
5. There is no designated DoD center for standardization or dissemination of S/V information.
6. Effective use of the available S/V data for timely responses to DoD problems is not currently possible for many potential users and critical uses.

2.3 WHO NEEDS S/V DATA AND WHY ?

Undoubtedly the largest consumers of S/V data are the "computer models" to evaluate target survivability and/or weapon effectiveness, including cost-effectiveness. "Trade-offs" are conducted at all levels of concept, design, development, procurement, deployment, modification, etc. It should be noted that S/V must compete with all the other desired system characteristics; e.g., mission performance, reliability, etc. Comparison of alternatives require S/V data in varying quantities and quality for various purposes; but since S/V is and intrinsic design characteristic, it can affect evaluations/decisions at many levels on almost all types of material. At the highest DoD (and congressional) levels, decisions usually involve selection for procurement between two major competitors; and unless each competitor has had equal access to the same applicable (government) data, S/V is not properly or fairly accounted for.

Actually, the potential impact of S/V data begins at the start of the design/development cycle for the embryonic aircraft/missile system. In fact, even before this, S/V data is required to establish realistic requirements. In conceptual configuration of the subsystems for a new aircraft, the designer must estimate the impact of subsystem alternative locations upon S/V as well as upon the overall effectiveness of the final design. In the next step, the subsystem designer must quickly evaluate many alternate materials, components and their locations. The vendors, who supply components and/or subsytems, should also have access to appropriate S/V data in order to make trade-offs among their alternatives (as well as to compare with their hypothesized competition). This process must continue through advance design, production and beyond (if design modifications become necessary). Invariably, new materials, components, fabrication methods, protection techniques, etc. arise, which require acquisition of new data by the designer(s) and/or by Government researchers. The integration of S/V into the design of a new aircraft is in fact an iterative process of design, evaluate, redesign, re-evaluate, etc. which requires access to S/V methodology and/or test data at every step. Government evaluations must also conduct parallel but more thorough assessments–preferably with the same data base and evaluation methods.

The process and the need/use of vulnerability lethality data is most similar in the design and optimization of a guided missile or AAA gun system. Since their objective is to kill an enemy aircraft, their effectiveness is ultimately measured by the vulnerability of the aircraft. Since a missile essentially comprises a warhead with fuze, a guidance system for target detection and acquisition, a propulsion system and a launch system, a designer must select the best combination of these major components which are available and compatible. This too becomes an iterative process of design, evaluate, tradeoff, new data acquisition (if necessary), redesign, etc. As in the case of aircraft design for survivability, parallel-lethality methodology and technical data are needed by contractor designers and Government evaluation–preferably from the same standardized data base.

To a lesser extent, a centralized S/V data base is also needed by the R&D generators of S/V–especially the DoD decision makers, who must select the S/V areas which require/deserve further exploitation for major advances in the state-of-the-art. New materials/technology continue to develop new potential capabilities. Unfortunately, improvements in overall capability frequently have equal potential to improve or degrade suvivability; e.g., the new filament composite materials for aircraft structures, new turbine engines, new guidance approaches (for missiles) among others. Hence, centralized assessment of the S/V state-of-the-art can also impact upon R&D planning. Similarly, new intelligence data can also motivate critical additional R&D (or stimulate overreaction) depending upon its assessment in proper perspective with already available data.

In summary, the design of an effective and survivable aircraft/missile or the design of an effective and lethal guided missile sytem (or most other military materiel) is an iterative process by the designer/producer. The Government evaluation process is also iterative, and both depend upon supporting S/V methodology and technical data–perferably the same data base (which does not now exist). To some extent, R&D planning also depends upon centralized assessment of the S/V data base. As an intrinsic design discipline, S/V data is needed by many designers and evaluators in Government and industry. Hence, it is not

surprising that 718 took the trouble to respond to the Questionnaire, and it is not surprising that over 90% of them recognize the need for a DoD-chartered center for S/V information. (See Appendix A for the variety of responders who need S/V data.)

3.0 RECOMMENDED SOLUTION

Given the need for S/V information and the current dispersed status of the S/V data base, the solution of the problem is the Information Analysis Center (IAC) approach—as clearly mandated by the DoD Office of the Under Secretary of Defense for Research and Engineering (OUSDR&E) Directive 5100.45 for such problems. Other alternatives are considered as a following paragraph, but none of them are acceptable.

3.1 WHAT IS AN IAC ?

An IAC is fully defined in Directive 5100.45. (see DoD policy statements in Section 1.3 herein). As a center, it is a focal point for an assigned specialized technology, i.e. S/V. As an Information Center, it is responsible for the accumulation of published and unpublished scientific technical information and timely responsive retrieval of such, for technically trained managers, scientists and engineers who need the information. As an Information Analysis Center, it is further responsible for "filtering and reduction of such information to insure that those who need it are provided with the best, the most pertinent and the most succinct information. . .with special emphasis on the evaluation aspects of the concept."

Nineteen such IACs now exist ranging in age from 1 to 36 years old. Sixteen of them were visited/interviewed during this investigation (see Appendix B). It is quite apparent that among them, operational precedents have been established for every conceivable "shade" of difference in operation.

All of them handle data with various restrictions, including at least three with significant deposits of security classified information, as anticipated for SURVIAC. The interviewed Directors emphasized the added complexities of security in storage, equipment, administration, timeliness, responsiveness, cost, etc. However, precedents and procedures have been established for dissemination to those with established clearance and need-to-know.

All of the IACs are technically monitored by a Government agency with leading competence in its technical field. Two of them are Government operated on DoD installations. Fourteen (of the sixteen visited) are operated by contractors including four on DoD installations. The newer contractors were selected competitively (although the older centers have not changed contractors over the years). Nine DoD IACs are administratively managed and funded by the DLA and DTIC; ten others are managed and funded by other DoD uniservice agencies. To offset costs, the DLA-funded IACs have various payment options for user services: i.e., subscriptions, purchase agreements, NTIS deposit accounts.

All of the IACs provide data searches, abstracts, bibliographies, state-of-the-art reviews, etc. to their users. Some provide varying degrees of data screening, analysis and evaluation – as intended by OUSDRE and definitely required in a proposed SURVIAC.

3.2 WHAT ARE ALTERNATIVE SOLUTIONS ?

It is quite apparent that the problem of disseminating S/V information has been chronic for a long time, and solutions have been tried before. In the fifties, the S/V technology was small enough, and its specialties were localized enough, that tri-Service and industry users could maintain personal contact with the data generating sources. In the sixties, many of the larger aerospace firms developed small but fairly permanent S/V teams which were able to keep up with the state-of-the-art according to their needs. In the seventies, several attempts were made by individual Government agencies, and groups of laboratories in common technical areas, informally and through the JTCG/AS. Some of the Government problems were alleviated, but at best these would have been only partial solutions had they succeeded in every case.

In some specialized technical fields, the data centralization/dissemination problem was solved through universities competent in their field, and/or through professional societies. However, the S/V discipline is incompatible with such an approach.

The creation of the JTCGs attempted to alleviate the problem through such means as the JMEMs, the Design Criteria and Industry Interface Subgroup (JTCG/AS), and most recently the JTCG/AS Newsletter. However, it is now apparent to both JTCG/ME and JTCG/AS, that these attempts lack the resources and dedicated manpower commitments to be sufficiently responsive.

There remains the option of a single agency or single service IAC but the DoD scale of the problem makes these alternatives equally unacceptable.

Since the DoD mandated IAC solution was intended specifically for the problem now faced in S/V, and all the operational procedures/precedents have now been amply demonstrated, SURVIAC clearly stands out as the only logical acceptable solution.

3.3 SURVIAC MISSION STATEMENT

The following proposed Mission Statement was prepared for early discussions with JTCG principal members and others when the SURVIAC approach began to surface as a logical solution to the S/V data dissemination problem. It was also circulated in the Questionnaires to the users. Since no disapprovals or objections were received, it is further endorsed by this study. Recommended Scope is discussed in a following paragraph.

PROPOSED MISSION STATEMENT FOR A SURVIVABILITY/ VULNERABILITY INFORMATION AND ANALYSIS CENTER (SURVIAC)

SURVIAC's mission is to perform the functions of a full-service Department of Defense (DoD) Information Analysis Center (IAC) as described in DoD Instruction 5100.45, "Centers for Analysis of Scientific and Technical Information." It will provide scientific and technical information and support activities to organizations within DoD and to their contractors. SURVIAC's principal field of interest will be the vital technical area of non-nuclear survivability/vulnerability as it relates to US/Foreign aircraft and missile systems.

SURVIAC's data bases will consist of those identifiable existing data bases of the nonnuclear survivability/vulnerability community and computerized bibliographical information on various relevant documents. It will be able to refer to constantly updated computerized bibliographical information on various relevant documents. It will update, review, appraise, and summarize information and disseminate such through bulletins, directories, bibliographies, and reports.

SURVIAC will also serve as a repository and ultimately perform configuration management control for survivability methdolologies.

SURVIAC will provide a single focal point within DoD for nonnuclear survivability/vulnerability information.

3.4 SURVIAC LOCATION

One consideration in the selection of a location for SURVIAC is the convenience of the users. Judging from the 718 questionnaire responders, S/V data users are widely distributed all over the country. (See Table A-9.5 of Appendix A.) The two most concentrated sections are the Washington, D.C. area (primarily Government) and California (primarily industry); which suggests a site in the Midwest as a compromise for the convenience of most users. It should also be noted that most of the IACs are also located in the Midwest, including those requiring closest coordination with the proposed SURVIAC.

A more important consideration is the location of required technical support. In general, IACs have small permanent staffs and depend upon part-time specialized experts to respond to many requests for services. All are associated and/or co-located with universities or DoD establishments for non-academic disciplines such as S/V. The centers of S/V

competence are Aberdeen, Maryland; Dayton, Ohio; and China Lake, California, among others. The USAF is the largest Service. With the Air Force Wright Aeronautical Laboratories (AFWAL) and the Aeronautical Systems Division (ASD), the Wright-Patterson AFB (WPAFB) complex probably offers a greater amount and variety of potential technical support than any other location. In addition, this complex is frequently visited for many reasons by all of the aircraft S/V data users.

Another factor in determining the location is the existence of CDIC at WPAFB. Of all the existing information centers, its Mission comes closest to that of the proposed SURVIAC. CDIC offers the most logical nucleus from which to start up the required full-service SURVIAC most expeditiously. CDIC is technically managed by the AFWAL Flight Dynamics Laboratory (FDL) and supported by the JTCG/AS and JTCG/ME. Currently it is not a full-service IAC, nor is it formally integrated into the DTIC-IAC network. It was established in 1970 as a focal point for "real-life" data in support of S/V evaluations. Since that time it has acquired a number of data bases relevant to S/V. While it is known to the S/V community, it is currently underutilized, apparently because it is not a full-service IAC and its technical mission and scope are limited.

Technically, CDIC has many advantages for expeditious start-up. This center has the unique advantage of already being involved in nonnuclear S/V for aerial targets. No other information center or other potential site is as familiar with the subject specialized technology. It is already well known to the intended users. It is already associated with the JTCG/AS and JTCG/ME, which SURVIAC is intended to support most directly. On-site technical monitorship is available from the FDL, which represents the leading S/V competence within the Air Force. The location is in the AFWAL complex, which is proximate to support expertise, which is an essential feature of all existing IACs. The Air Force management of the AFWAL and the FDL have already expressed their willingness to support SURVIAC as sponsored by the JTCG/AS. Most significantly, its data/document holdings already include a significant proportion of the S/V data base which must be acquired to operate a full-service SURVIAC. To perform its current Mission, CDIC has centralized the largest collection of combat damage and combat operational data from Southeast Asia and the Middle East, including fixed wing aircraft, helicopters and ground vehicles. Significant test data bases have been collected in the new threat area of HEL, as well as ballistic damage, including the data collected by NMIAC (now discontinued). CDIC has also developed a library specifically dedicated to documents in direct or indirect support of S/V analysis and evaluation. In summary, CDIC currently lacks a complete collection of the available S/V documents and the S/V analysis capability which are both essential for a full-service SURVIAC; however, technically it provides a good starting nucleus for both.

Operationally, CDIC also offers very significant advantages: it has an established staff and facilities as an Information Center, and operates as such. The library (while not complete) is available for users who need to visit and personally pursue (hard copy) reports. Suitable storage space, for both classified and unclassified documents, is available. Computerized data retrieval programs are available, as well as computer facilities. Computer terminal ties with DTIC (and with other IACs through DTIC) are available at AFWAL, for both classified and unclassified documents. Note that the special problems of handling

classified documents were emphasized by all the IAC Directors that were interviewed. CDIC could be expanded to the SURVIAC full mission in a rapid smooth transition. Any other selection would involve an additional year or more in order to build up to the same level of capability.

Final selection of the SURVIAC location must, however, be based on many factors. Alternate locations should be considered. The relative criticality of user requirements may differ significantly enough to justify a location other than that of the current CDIC. Factors may also indicate the need to consider one or more satellite locations to fullymeet user needs.

To ensure that the best and most cost effective location is selected, the SURVIAC Request for Proposals (RFP) will permit recommendations for alternate locations. Any such recommendation must be fully justified by a supporting cost/benefit analysis.

4.0 SURVIAC SCOPE

From the previous discussion in this report, it is evident that the scope of the S/V design discipline is extremely broad. The intended scope of the proposed full-service SURVIAC is most easily defined by its limitations.

4.1 LIMITATIONS

As proposed, the SURVIAC technical scope has been restricted to nonnuclear threats against aerial and other targets. Nuclear threat information is excluded primarily because DASIAC is already responding to user needs in this area. However, close coordination must be developed between SURVIAC and DASIAC for the benefit of the users and DoD. The SURVIAC scope does, however, include all methodology and supporting data on all other threat effects pertinent to S/V design and evaluation, including directed energy and chemical/ biological as well as conventional ballistic (bullets, shell, blast, fragments). It includes crash phenomena and natural environmental damage effects closely relevant to S/V. It also includes detection and related electromagnetic measures, countermeasures, and counter-countermeasures relevant to S/V. As proposed, the SURVIAC scope places initial emphasis on aerial targets, including fixed and rotary winged aircraft, manned and unmanned. It is intended to meet the data needs of users designing/ evaluating more suvivable aircraft and missiles, as well as designers/evaluators of anti-aircraft weapons of all types. (While the User Survey demonstrated significant similar needs for numerous surface targets, it is deemed necessary for SURVIAC to concentrate on aerial targets, at least initially). The scope of source data to be collected is not restricted to DTIC documents nor to published data (however, all data release restrictions by the Government and/or industry sources of the data must be honored.) Per DoD Directive 5100.45, the intent of all IACs, including SURVIAC, is ". . .to insure that those who need it are provided with the best, the most pertinent, and the most succinct information." The only limitations in operational scope are the available resources to respond and the priorities set by the technical monitor.

4.2 FUNCTIONS

The essential functions of the SURVIAC are as follows:

1. Locate all S/V documents and unpublished data directly relevant to lethality, vulnerability, survivability, detectability within the defined scope.

2. Identify all potential sources of new S/V information and establish contact with all active generators of new S/V data.

3. Establish data control procedures to honor all legitimate restrictions.

4. Establish contact and coordinate closely with other IACs, including at least DASIAC, IRIA, GACIAC, TACTEC and others involved with S/V related information. The intent is to meet user needs jointly, effectively, and promptly with minimum effort.

5. Collect all required data in a suitable form: e.g., library hard copy for key documents, microfiche or other for document screening and evaluation. (Physical acquisition is not necessary for documents available to SURVIAC and users through terminals of computerized data bases.)

6. Provide required storage for classified, restricted, and unrestricted documents/data.

7. Sort, organize and categorize available data into meaningful S/V subsets with cross references. Purge obsolete information. Develop key word/phase identifier/descriptions suitable to S/V information categories and users.

8. Develop computerized document/data retrieval systems (with built-in controls on the release of restricted information).

9. Abstract documents, as necessary for S/V purposes.

10. Develop a file of available experts in all S/V specialties, to call upon for information analysis/evaluation, screening and/or to assist in responses to users when necessary.

11. Systematically filter, screen, analyze, evaluate all accessible documents by S/V information category.

12. Develop a file of S/V actual and potential data users and generators and publicize SURVIAC holdings and available services through periodic Newsletters, Current Awareness Bulletins, or other appropriate means. (The JTCG/AS directory provides a starting point.)

13. Conduct state-of-the-art reviews by S/V information category.

14. Conduct searches upon user request—for document identification, and abstracts as needed. (SURVIAC will not reproduce documents available from DTIC, NTIS, or other equivalent sources for redistribution to users.)

15. In support of and upon request by the JTCG/AS and JTCG/ME, organize and conduct necessary conferences, symposia, workshops and other appropriate means of information dissemination. Publish proceedings.

16. As required by DLA/DTIC, develop means of user charges, appropriate to the services required and rendered to the users.

17. In support of future DoD RFP/RFQs, prepare lists of appropriate reference documents to identify information most relevant to S/V requirements.

18. Perform all other tasks necessary to improve the dissemination of S/V information to users who need it.

4.3 START-UP AND DEVELOPMENT

The intent of SURVIAC is to improve the flow of critical S/V information as rapidly as possible. The current means of dissemination, e.g., DTIC, existing IACs, etc. shall be fully exploited immediately. Enhancements of data categorization, evaluation and dissemination to users shall be systematically implemented by SURVIAC, as soon as they can be developed. Priorities should identify and respond to what information is most critical, and which enhancements will most quickly provide the most needed information to the largest number of users.

5.0 REQUIRED RESOURCES

The physical resources, i.e. space and equipment, and the operational expertise required for SURVIAC are simple, straightforward and well-precedented in the operating IACs. Over 1000 potential users of S/V information exist, representing an estimated 300 DoD agencies and supporting contractors (see Appendix A). The population of S/V related documents (to be screened) cannot be quantified precisely at the present time, but it may be as high as 30,000 (see Appendix C). It is anticipated that this will probably reduce to less than 10,000 important users, once screened and evaluated, but a growth rate of new S/V documents to be incorporated at about 2,000 per year is foreseen. Most other IACs operate responsively with permanent staffs of 5 to 10 (see Appendix B). For SURVIAC, data control and data analysis requirements present unique problems, in addition to the need for rapid set-up and start-up.

5.1 EXPERTISE

IAC operation requires two basic types of expertise: operational and technical. The collection, processing and dissemination of information requires information specialists

(and facilities) plus management and clerical support personnel. The analysis and evaluation of the information requires technical expertise in the various specialty subsets of the S/V technology/discipline. In general, the operational staff must be full-time, but most of the technical staff can be part-time on-demand as needs arise. Among the other IACs, precedents have been established for the use of Govenment and non-Government experts, active or retired, by subcontract, consulting agreements and other arrangements with or without remuneration.

5.2 FACILITIES

The basic facilities required for IAC operation are: working space, document storage space, modern computer storage and retrieval equipment, and effective communications (i.e., terminals for organized data bases). Document storage and communications are complicated by security classifications. While the actual equipment varies to suit mission specifics, all required facilities have established working precedents and procedures in the existing IACs and other agencies. Minimal time should be consumed to determine what is best for SURVIAC and its users.

5.3 STAFF

Whether Government or contractor-operated, minimal full-time IAC staffing consists of a director/manager, a secretary, a technically oriented point-of-contact (for users), and two information processing technicians. Additional full-time and part-time staffing is required depending upon: the nature and status of the discipline/technology, the size of the user community, the size and status of the document population, the requirements for data technical analysis/evaluation, the required response time, and the overall mission of the IAC. For existing centers, staffs vary from 5 to 35 but most of them operate responsively with less than 10 full-time personnel, and nearly all are supplemented by part-time help from their parent organizations, consultants, or others.

Specifically for SURVIAC, the S/V discipline is large, varied and critical to DoD; and the current information status is confused, chronic and getting worse. The user community is average in size (for IACs) but more varied than most. The precise size and status of the document population are unknown, and most of the useful data are classified and/or restricted. Technical analysis/evaluation of the accessible data is definitly required. Response times of one week or less are desired to meet user needs. The overall SURVIAC mission includes support of two JTCGs, as well as the burden of organizing and starting up a new center. Reasonably, under such conditions, the following additional staffing is required. One additional technically oriented point-of-contact is required, who could also serve as assistant director and/or security officer for data control. The present status of the S/V data base, and the additional effort for starting up, justifies at least two more information processing technicians. The SURVIAC essential need for data analysis/evaluation will require the equivalent of at least two S/V technical professionals, however, and support should involve three

to ten specialists to cover the variety of S/V subsets. Hence, a staff of eight full-time personnel is recommended for an initial SURVIAC, plus part-time specialist support equivalent to two more (full-time).

5.4 FUNDING

Preliminary estimates indicate a SURVIAC need for basic funding support as follows:

FY 85	FY 86	FY 87	FY 88
750K	825K	907K	998K

Such levels appear too conservative, considering the recommended staff of 10, and the many other significant incidental expenses associated with IAC operation, e.g., computer, printing, mail, etc. (see Appendix B). However, in the first year, full staffing is unlikely to be achieved, which is likely to compensate for other start-up costs. Beyond the first year, supplementary revenue is anticipated from user fees. The survey indicates more than half of the total users are in industry, and 63% of them indicated that assessment of nominal fees would not limit SURVIAC use. The dissatisfaction of the S/V data users with the present status of data dissemination is exceedingly clear from the survey. Conversely, the willingness (and economic advantages) of paying for timely information is equally clear from the success of the IACs. If SURVIAC can deliver authoritative information succinctly and promptly for reasonable fees, supplementary funding probably will assure a reasonable growth rate.

The IACs now utilize several payment options and combinations thereof with varying degrees of satisfaction (see Appendix B). No specific option is recommended herein for SURVIAC. However, the "subscription package" approaches (used at IRIA, GACIAC, SVIC, DACS) appear most compatible with the S/V information users/uses, and with the intended products/services of the proposed SURVIAC. In any case, early decision on this matter will impact upon th growth of SURVIAC.

6.0 IMPLEMENTATION PLAN

The following comments present rationale for a general implementation plan for the proposed SURVIAC. Further detail would be presumptuous for this study at a time prior to decisions on: approval, funding level, site selection, manager selection, and priority guidance on efforts most critical to DoD as a whole. In any case, considerable response flexibility remains.

6.1 GOALS AND OBJECTIVES

The ultimate SURVIAC goal is essentially the same as for all other IACs: to get a variety of critical information which exists, to many users who need it, when they need it, in a form that they can understand and use authoritatively. Intermediate objectives are:

1. Locate all S/V relevant information.

2. Develop a DoD center as a user focal point to fund all the available information relevant to his S/V needs.

3. Categorize the available data into meaningful S/V subsets to serve all the various users/uses.

4. Develop in-house computerized data storage and retrieval system(s), and systematically add necessary abstracts, identifiers, descriptors and cross-references in order to enter all potentially useful information into the system for future timely recall and responsive searches.

5. Review, screen, purge, analyze, evaluate and standardize information to succinct up-to-date authoritative status summaries in each significant S/V subset.

6. Publish state-of-the-art reviews on the significant S/V subsets—partly to update users, partly to identify technical gaps for potential additional R&D.

7. Support DoD evaluation as needed including JTCG/AS and JTCG/ME efforts.

8. Develop and maintain a file of experts (individuals and agencies) in each S/V subset for references to users who need to reach data generators. Include a subfile of specialty experts available to assist SURVIAC in data analysis and evaluation.

9. Identify the required input data for approved documented models, and systematically review and improve such input data.

10. Prompt complete response to every user inquiry (i.e., within one week or less).

6.2 MANAGEMENT

As DoD IAC, SURVIAC will be administratively managed by DLA, which includes DoD funding and competitive selection of the contractor operator. As a service for DoD in the S/V discipline, SURVIAC will be technically directed by the JTCG/AS and JTCG/ME through a program manager/technical monitor. For additional guidance to the technical monitor, a Steering Committee will be established consisting of representatives from the user community as well as the two JTCGs. This Steering Committee will be chaired by the technical monitor. SURVIAC operations will be managed by a Director designated by the selected contractor. The recommended staffing is eight full-time personnel plus necessary part-time technical support, as described in a previous section (5.3). The operations will be similar to other IACs with special emphasis on technical analysis and evaluation of the data to meet user needs. Critical task priorities will be determined by the JTCGs. The designated Center Director will be responsible for the planning and execution of tasks, and all other operational factors to achieve the SURVIAC objectives including response to users. The recommended site is CDIC monitored by AFWAL/FDL at WPAFB, Ohio. The projected operational date as a full-service IAC is FY 85, with anticipated DLA funding of $750K (as identified in Section 5.4).

6.3 PRE-IAC PHASES

Through FY 84, the JTCG/AS and JTCG/ME will continue to support the CDIC and the JTCG Model Repository through the AFWAL/FDL at WPAFB, Ohio. Eventually these functions will be absorbed in a full-service SURVIAC. In anticipation of SURIVAC, the JTCGs will also begin to assign preparatory tasks to these centers and other elements of the JTCGs. Among other tasks, CDIC will be requested to define the existing S/V data base; i.e., by iterative search strategies, identify, count, locate, and obtain abstracts of all (nonnulcear aerial targets) S/V-relevant documents–in the DTIC, NTIS, the IACs with S/V overlap, the JTCG/ME and all other smaller data bases (not computerized). Concurrently, the Model Repository will be requested to identify and categorize all S/V data required for input to the approved, documented models. Another (contractor) task initiated in FY 82 through NWC will be completed, with the intent of demonstrating how to analyze available S/V data and enter it into a SURVIAC system by actual example with one essential S/V subset., i.e., aircraft engine vulnerability information. Given success on these three efforts, another task will be to identify all the S/V categories and sub-categories (of available data) which would be meaningful to various potential SURVIAC users. The general goal of these and other tasks is to define the available S/V data base before SURVIAC implementation. In the process, the data sources will be identified and the means of coordination will be determined. As the tasks are completed successfully, the process will continue to define all factors necessary for SURVIAC set-up.

6.4 SURVIAC SET-UP PHASE

When the full-service SURVIAC is initiated in FY 85, the S/V data base will have been located, defined, described, and partially prepared for a storage and retrieval system. The system requirements and practical means of indexing and storing the information will also have been investigated in detail. The general goal in the set-up phase will be to accomplish all the tasks necessary to initiate service to users. This phase is anticipated to consume about one year, depending upon the number of documents uncovered, their variety and the difficulties encountered in categorizing and describing them sufficiently. The following necessary tasks will be initiated and implemented concurrently during this phase:

1. Develop an in-house storage and retrieval capability specifically for the S/V data base, including built-in features to insure required control of the data. Necessary equipment (if any) will be identified and procured.

2. Develop and implement a data format with indexing and cross referencing, to specifically cover all required sub-sets of S/V information in sufficient detail to conduct searches and to produce bibliographies for desired user topics.

3. Systematically collect the available S/V information including abstracts and identifiers (as a minimum) on a continuing basis.

4. Systematically index and format the acquired documents/information for entry into the storage and retrieval system, on a continuing basis.

5. The procedures to provide data technical analysis/evaluation capability through part-time experts in S/V specialties will be defined and implemented, including the identification of available experts in all of the S/V specialties.

6. Technical data analysis/evaluation will be initiated on each S/V specialty as soon as SURVIAC acquires the capability to do so. Such analysis/evaluation will continue systematically as long as necessary.

7. Since DTIC will probably be the largest source of input to SURVIAC, this interface will be defined in sufficient detail to provide all required support, routinely and quickly. Accepted routine procedures must assure control of classified and restricted data with minimum handicaps to responsiveness.

8. Similarly, effective timely routine procedures will be worked out with DASIAC, IRIA, GACIAC, TACTEC, and any other S/V-related IACs, in order to assure timely joint responses to users when necessary.

9. Incorporate the combat damage (CDIC) information into the full-service SURVIAC for integrated output to improve responsiveness.

10. Incorporate the Model Repository output into the full-service SURVIAC, and identify the requirements of approved documented models for input data, and that data which can be improved by other SURVIAC information. Implement such improvements on a continuing basis.

11. As soon as the SURVIAC output can be defined with reasonable certainty, measures of publicizing the capability to the user community will be identified, developed, and implemented.

12. With necessary input from the management (DLA and the JTCGs), from the experienced IACs, and from the user community, a suitable user fee system will be selected to support user services and supplement SURVIAC funding.

13. Test the SURVIAC response capability with realistic examples of anticipated user questions (e.g., from Appendix A of this report).

The above set-up tasks should be completed within a year or sooner, depending on the accomplishments during the Pre-SURVIAC Phase. At this time, SURVIAC would be ready to provide service to users.

6.5 SURVIAC START-UP PHASE

Once SURIVAC is set up, the primary goal will be to publicize and "prove" itself. However, the following tasks will continue, probably as long as the Center exists:

1. Expansion of the data base, with emphasis on new information and effective contacts with the generators of new S/V data.

2. Improvement of SURVIAC technical analysis capability, with emphasis on S/V specialties most critical to DoD and the user community.

3. Improvement of SURVIAC technical analysis capability, with emphasis on user contacts to encourage feed-back of their data to improve the SURVIAC data base.

4. Increased coordination with other relevant IACs to enhance joint responsiveness to users.

In addition, the following additional tasks will be undertaken:

1. Current Awareness Bulletins and other feasible services with user demand.

2. State-of-the-art reviews in S/V specialties.

3. Identification of technical data gaps (to JTCG/AS and JTCG/ME).

4. Anticipation of the data needs for new DoD procurements/competitions.

By the end of its second year, SURVIAC should be a visable asset to DoD and its supporting contractors, with significant influence on the improvement of the survivability and the overall effectiveness of future materiel.

6.6 SURVIAC CONTINUED DEVELOPMENT

Once SURVIAC is recognized, accepted and utilized, its goal will be to improve the quality and the timeliness of its service. Another goal will be to increase the utilization of S/V information and thereby its impact upon material improvement. Additional needs for support of the JTCG/AS and JTCG/ME should be anticipated.

The following other possible services are within the scope of a full-service SURVIAC:

1. Support the development/revision of Draft MIL-SPECS, MIL-STDS, MIL-Handbooks, and design guides, with verification data.

2. Maintenance of survivability handbooks.

3. Annual compendia of survivability and related R&D.

4. Directories of facilities, activities, and scientific/technical specialists in survivability/vulnerability.

5. Quarterly newsletters and journals.

6. Scheduling, planning, conducting, and documenting workshops, symposia and conferences, in identified areas of S/V.

Once caught up with the generation of S/V information, it should be readily feasible for SURVIAC to keep up with the supply of new data. As for user service, a continuing large demand must be anticipated for many years: however, the growth (or decline) of such demand is difficult to predict at this time.

7.0 DoD REQUIREMENTS FOR IAC ESTABLISHMENT

Approval by OUSDR&E is required for the establishment of a new IAC. According to the latest draft of DoD Directive 5100.45 (26 May 1982), Section IV A2: "Approval shall be based on, but not limited to, the following criteria:

1. Documented evidence of a requirement to fill a void in an emergency DoD technology thrust area.

2. Clear definition of subject fields to be covered, and demonstration that other centers or sources do not duplicate the proposed Center.

3. Cost and effectivenss evaluation of the alternate ways of accomplishing the objectives of the Center.

4. Adequate financial support, and plans for continuing support, to achieve the announced objectives of the Center.

5. Active support of the Center by persons engaged in the type of technical work to be covered by the Center's information products."

This report and its supporting appendices clearly demonstrate the need to establish a mission-oriented Information Analysis Center dedicated to the survivability/vulnerability design discipline, according to each of the above five criteria.

8.0 SURVIAC BENEFITS

The establishment of the proposed SURVIAC will provide many direct and indirect benefits to the whole Defense community. The following few are cited for major DoD significance.

The most important benefit is the potenital improvement of survivability and overall effectiveness of aircraft and anti-aircraft systems. Material requirements for quantified S/V keep increasing, but many designers and even Government evaluators cannot respond properly, while years of applicable R&D "rot away, essentially lost in the files".

By improving the quantity and quality of S/V information, SURVIAC will improve the quality of competition. By improving its accessibility to users, it will also improve the fairness of competition. By improving responsiveness and timeliness, it will also reduce the cost of S/V to contractors, and indirectly to DoD.

SURVIAC should also benefit the R&D planners. Centralization of the S/V data base will make critical "data gaps" more visible and easier to define. By surfacing all the related information together, the risk of "reinventing wheels" will also be greatly reduced.

SURVIAC will also improve the perspective of the whole S/V community. At the present time it is difficult (if not impossible) to appreciate the relationships between various S/V specialties and their impacts upon each other.

9.0 REFERENCES

1. DTIC/DLA Pamphlet Information Analysis Centers PROFILES for Specialized Technical Information.

2. DoD Instruction 5100.45 (28 July 1964) and latest (draft) revision (26 May 1982), Subject: Centers for Analysis of Scientific and Technical Information.

Appendix A

ANALYSIS OF QUESTIONNAIRE SURVEY TO DEFINE THE INFORMATION NEEDS OF THE SURVIVABILITY/VULNERABILITY COMMUNITY, AND THE DESIRED SCOPE OF A PROPOSED INFORMATION ANALYSIS CENTER--SURVIAC

APPENDIX A CONTENTS

Tables:

Tables: (Contd.)

A-1.0 BACKGROUND

Survivability/Vulnerability (S/V) Information is a critical input to the design of practically all types of military equipment. Timely access to the available data, poses a continuing problem to all potential users. Data has been generated and documented since the 1940's by scattered agencies, and used by numerous equally scattered agencies/companies. As S V and other technologies advance, keeping up with the quantity and variety of specialized data has become increasingly difficult. Even when all the available data is located, there remains the critical analysis problem of identifying that information which is most relevant to any given specific problem. The Joint Technical Coordinating Group on Aircraft Survivability (JTCG/AS) was created in 1971, specifically to coordinate the R&D S/V resources of the tri-Services for the benefit of the Government/industry aircraft community. Even earlier, the Joint Technical Coordinating Group for Munitions Effectiveness (JTCG/ME) was created to meet similar needs of the munitions/weapons community for lethality/vulnerability information. Meanwhile, the DoD has encouraged/supported the concept of Information Analysis Centers (IAC) in other specialized technologies with problems similar to S/V. Since many of these centers have demonstrated responsiveness and operational efficiency, the same approach, i.e., SURVIAC, is now being investigated jointly by the JTCG/AS and JTCG/ME. To assure responsiveness to the S/V community, a survey was initiated. A sample questionnaire is enclosed, together with cover letter, and a Proposed Mission Statement for a SURVIAC. This Appendix discusses the objective and procedure of the Questionnaire Survey, and analyzes the results.

A-2.0 OBJECTIVE

The primary objective of the S/V Information User Survey was twofold:

1. To define the type and form of S/V information mose urgently needed/desired by the Government/industry S/V community.

2. To define the scope of products/services desired by potential users of a proposed SURVIAC.

3. To increase the awareness of the S/V community to many services and sources of information already available from existing IACs. While none of these centers specifically address all the necessary S/V data, a number of them adequately cover significant interface specialities, e.g., infrared detectability, material properties.

4. To highlight the potential overlaps of the proposed SURVIAC with other IACs in order to minimize duplication, maximize mutual support, and exploit the benefits of the collective IAC/DTIC network.

5. To provide a timely opportunity for meaningful input to SURVIAC planning, by a maximum number of the users, which it is designed to serve.

6. To identify the relative importance of the many S/V information problems, in order that the most urgent needs are recognized as soon as possible in the planning, formation and development of SURVIAC.

A-3.0 PROCEDURE

Mainly, this appendix presents the results of the *Questionnaire* Survey of the users of S/V information. The preparation of the questionnaire and the preceeding events were as follows. First, the apparent chronic problems (and hear-say complaints) on the timely dissemination of pertinent up-to-date S/V data, were discussed by the principals of the JTCG/ME and JTCG/AS, and various options for problem solutions were considered. As the Information Analysis Center concept approach became more attractive, further investigation was directed to the organization and operation of the existing centers. Sixteen of these IACs were actually visited to clarify the technical interfaces with a proposed SURVIAC, to determine the scope and variety services offered by the different centers, to identify the similarities and differences of their data bases with those of the S/V technology, and to estimate the corresponding resource requirements applicable to SURVIAC. (This procedure and its results is presented in Appendix B.) Next, a preliminary Questionnaire was prepared to poll the S/V community on the apparent information problems and the proposed SURVIAC approach for solution. On March 28-31, 1982 a meeting of the American Defense Preparedness Association (ADPA) Ballistics & Vulnerability Division at Fort Sam Houston in San Antonio Texas, provided an ideal opportunity for preliminary survey to "feel-out" the community reaction and to test the Questionnaire. Eight Government and fourteen industry immediate responses provided sufficient input for necessary minor revisions. (These responses are included with the main survey reported herein.) The resulting final questionnaire is attached at the end of this Appendix. Two mailing lists were used: The JTCG/AS newsletter list of 2375 which emphasizes the aircraft side of the S/V community, and a broader ADPA list of 1800, to cover the S/V interests in munitions, missiles, land and sea surface targets. The Questionnaire and its outstanding response are detailed in the following tables and comments. One additional input was a previous smaller survey conducted by the newly established Survivability Model Repository which respresents a solution to a critical subset of the total S/V information problem.

A-4.0 QUESTIONNAIRE

Basically the Questionnaire is a simplified opinion poll, with sixteen questions requiring three types of answers. Most (14) of the questions were multiple choice types requiring either a yes or no or simple check marks for selection of items from given lists. The

advice of pollsters was to keep the survey simple and "effortless" in order to encourage responses. Two of the key questions (10 and 12) required ranking some listed items from 1 to 4 in order to identify the preferences (relative needs) of the users in desired products/services, and especially in the most useful forms of information desired. It is apparent that such preferences impact significantly upon the responsiveness of SURVIAC output, as well as the required organization and resources. Finally, the Questionnaire provides ample opportunity for comments, questions and recommendations, to encourage participation by the responders. In general, the Questionnaire format was successful in eliciting the meaningful responses.

In substance, the Questionnaire addressed the following areas:

1. Basic issues of the SURVIAC concept.
2. Problems presently encountered.
3. Desired output.
4. Delineation of user interests in targets, threats and S/V technical elements.
5. Present sources of data/information used.
6. User preferences in products/services.
7. User awareness and utilization of the existing IACs, and the suitability of the IAC approach to S/V information.

Additional questions were employed to describe the population of Government/industry responders: i.e., regular activity, educational background, geographic distribution, type of organization, and user versus generator of S/V data. These were intended to determine the variety of interests within the S/V community. Upon receipt of the responses, the Government agencies and industrial companies were separated for analysis comparison.

A-5.0 RESPONSE

A total of 718 questionnaires were filled out and returned–343 from Government and 375 from industry–which represents an outstanding response of 17.2%. (According to experienced pollsters, a 2 to 5% response is considered good for this type of survey.) The importance of the problem and the interest of the community was also reflected in the quantity and type of volunteered comments and questions, and the willingness for further discussion on the subject. The general statistics of the response are summarized in Table A-1. Necessarily excluded, were a few "letter" responses which declined to return the Questionnaire for various reasons. It should also be noted that most responders were acting as individuals of the S/V professional community. In a few cases, their responses were endorsed by

their agency/company; in a few cases, the parent organization responded with a consolidated team opinion or with a group of questionnaires with differing opinions. However, it is emphasized that the results of this survey represent a consensus of S/V community individuals, not necessarily a consensus of the agencies they represent, and definitely not an official endorsement by all the Government agencies and industrial corporations surveyed. Nevertheless, the broad representation was gratifying; i.e., 123 Government agencies and 118 industrial companies.

Note that the individual responses and the represented agencies were split quite evenly between Government and industry (i.e., 48% versus 52% for individuals and 51% versus 49% for agencies.) This was not influenced by any intended pre-selected factors or controls. However, it is a fortuitous coincidence which facilitates comparison of the sub-populations polled. It also simplified the interpretation and application of the survey results.

Five hundred and four (70%) of the responders completed the questionnaires without further comments. But, the remaining responders demonstrated considerable interest, with questions, recommendations, and comments, both long and short. Three hundred and one (42%) signified willingness for futher discussion of the problem. (Unfortunately, time did not permit further discussion in depth with so many interested participants.)

A-6.0 ANALYSIS

The Questionnaire responses are summarized in Tables A-1 through A-10, and discussed in related groups of questions in the following paragraphs.

A-6.1 BASIC ISSUES

In order to proceed with the current SURVIAC plans, the endorsement of the S/V community is essential on certain key issues:

Does a need exist for a center for S/V information?

Should it be chartered as a DoD Information Analysis Center?

Would the communitiy use such a central source if available?

Is the IAC approach(es) considered appropriate and/or adaptable to S/V technology?

Would a nominal customer fee limit the use of a SURVIAC?

User opinions were solicited in the poll on these issues, respectively by Questions 1, 2, 3(b), 8(b) and 15. The responses are summarized in Table A-2. Note the very small difference

in opinions between Government and industry responders. In general, the industry response is slightly more positive, i.e., 1 to 6% on four of the issues, and 16% on the question 8(b), the suitability of the IAC approach for S/V.

Considering the Government/industry sectors separately or collectively, the poll indicates overwhelming agreement/support on the first three issues. The "yes" votes were respectively 91, 84, and 88%. Note that a number (5%) of the responders would use an available central source, whether or not they agree that it should be chartered by DoD. The "no" votes average a mere 5% on all three questions. The "blank" responses could have been discounted in the analysis, but they are listed to represent the various "shades of indecision, especially (i.e., 11%) on whether the central facility should be chartered by DoD. In summary, the poll confirms the need for a center, that it should be chartered by DoD, and that responders would use it if it were available—by a margin of about 20 to 1. The reasons for minority opinions and the indecisions are listed as comments in Tables A-10.3 and 10.4 (if they were stated).

Opinions on the other two issues are favorable to current SURVIAC planning, but as expected they are not as one-sided. On question 15, "Would nominal service fees limit the use of SURVIAC?" 60% responded "no", 26% responded "yes", and 14% were apparently undecided. Note the small difference in opinions between Government and industry responders. The fee/cost was a direct concern for the individaul consultants and the very small companies. For the Government and large companies, the real concern was "red-tape" delays and accounting costs rather than the actual cost. Some responders also objected to a fee system on the general principle that Government agencies should not charge for technical data in the public domain. Minority opinions are listed under comments (Table A-10.1).

On Question 8(b) "Do you consider the IAC approach appropriate, adaptable to S/V data/technology?" The response was favorable by a margin of 5 to 2, but 66% of the industry responders and 78% of the Government responders declined to say yes or no, mainly on the basis that they were not familiar with any of the existing centers. Such a finding is disturbing, especially when a few of these centers have a significant interface with S/V data, and some have been in operation for a decade or longer. It is hoped that this survey may stimulate many of the responders to exploit, or at least investigate these resources which are already available. This problem is demonstrated in detail by Tables A-8.1, 8.2, 8.3, and discussed further at a more appropriate point in this Appendix.

A-6.2 PRESENT PROBLEMS

Question 9 provides the responder an opportunity to confirm listed problems that are suspected in the dissemination of S/V information. It also permits "writeins" of additional problems encountered. The results are summarized in Tables A-3.1, 3.2 and 3.3. The survey definitely confirmed that the five suspected (listed) problems are indeed major problems to those who critically need it. Only 1 or 2% of the responses suggested no handicap by the listed problems which are: (1) unavailability and/or inaccessibility needed information and (2) unawareness of available data and methodologies: checked by 73% and 58% of the total

responders, respectively. The other three listed problems were slightly less serious, i.e., about 40%, 34% and 28%. Respectively these problems were listed as: (3) inconvenient/ incomplete form of information, (4) information not oriented/slanted to (specific) needs (of responder), and (5) poor quality (unreliable, dated, etc.) information. Note that the Government and the industry populations differed by less than 12% in their opinions on any of the five problems. Such agreement between the two groups adds credence to the ranking of problems, and to their relative importance to the S/V information consumers. It definitely confirms that the major problems to be solved by SURVIAC have been correctly identified.

Table A-3.1 also identifies about 9% "other" problems noted as write-ins by the responders; and these are all listed individually (by survey code number) in Tables A-3.2 and 3.3. In general, however, the "other" problems written-in by the responders were not essentially different from the suspected problems as listed in Question 9 of the questionnaire. The Government responders identified: (1) poor quality of data, (2) accessibility, (3) availability and (4) standardization, as the S/V information problems. For the industry responders, the write-in problems were: (1) availability, (2) accessibility and poor quality. The write-ins by the responders detailed existing problems more specifically, but note that generally, they confirm the suspected user problems identified in the Questionnaire list, i.e., unavailability, inaccessibility, and unresponsiveness. It is apparent that SURVIAC must address these needs of the S/V community in order to be successful.

A-6.3 DESIRED FORM OF DATA OUTPUT

A key determinant in the planning of the proposed SURVIAC is to identify not only the variety of critical data needs in the S/V community, but also the form(s) in which it must be delivered in order to be usable and responsive. The visits to the exisitng Information Analysis Centers (Appendix B) revealed a considerable range in the level of data analysis required to serve their respective technical communities. These ranged from relatively simple (but efficient) bibliographical service to complete technical analysis and interpretation of data in highly specialized technologies. The S/V community essentially comprises a relatively small number and variety of "data users", who must "put it all together in proper perspective" in order to serve the needs of the Department of Defense to quantify the survivability and/or lethality of U.S. and/or foreign equipment. Although some agencies are both generators and users of S/V data in their missions/ technologies of interest, one goal of SURVIAC is to serve the overall S/V community as an effective interface between data users and data generators. Such a need is clearly reflected in the general response to the Questionnaire Survey.

Question 12 was intended specifically to identify the level of data analysis desired by the overall S/V community, i.e., the responder preferences in the form(s) of data output from a proposed SURVIAC. The responders were asked to rank five listed levels of data analysis or forms of output, from most important to least important, and they were also given the opportunity to write-in "others". Obviously, the organization and operation of a proposed SURVIAC depends critically upon its output requirements.

The responses to this key question are compiled in Tables A-4.1, 4.2 and 4.3, respectively for total, Government and industry responders; the "other" write-ins are listed in Table A-4.4. In all respects, the responses of the Government and industry sectors were most similar. Preference for "data with analysis" is clearly demonstrated by the responders, and first or second choice by 83%. Second preference was for "data with comments", as indicated by its selection for first choice by 38% of the responders. Relative preference for the listed forms of possible output are summarized as follows:

		First choice (%)	Second choice (%)
1.	Data with analysis	60	23
2.	Data with comments	38	40
3.	Flexibility in data formats	15	23
4.	Topical data sources only	10	16
5.	Raw data identification only	6	10
6.	Other (write-ins)	3	—

The Survey clearly shows community need for analysis of the data delivered for their use. Note the decline in preference for data with decreasing degrees of evaluation. Considering the variety of data within the S/V technology, this implies that SURVIAC access to specialty experts is essential for a responsive output to a large majority of the S/V community. The write-ins (Table A-4.4) identify some of the more specific desires of some responders, but in general they confirm the preference trends reflected by the five items listed in the Questionnaire.

A-6.4 DATA TYPES OF INTEREST

The S/V community needs/interests include a variety of threat types against a variety of targets for a variey of purposes. It is this variety of interests to be served which primarily determines the scope (and reasonable limitations) of a proposed SURVIAC. Accordingly, questions 4, 5, and 11 of the user survey were intended to define, and possibly prioritize community interests and needs.

A-6.4.1 Target Types

The response on target types of interest is presented in Tables A-5.1, 5.2 and 5.3, for both the Government and industry sectors. In percent of responders, Table A-5.1 demonstrates high interest in all the listed types of targets, i.e., 30 to 79%. The ranking of interests was: (1) fixed wing aircraft, (2) other aerial targets, (3) land surface targets, (4) ships and (5) space targets. (The ranking may have been influenced by the population surveyed, i.e., the JTCG/AS Newsletter mailing list.) None of the listed targets indicate negligible interest

by the Government or by the industry responders. Significant differences between the two sectors are evident on some targets of interest, e.g., missiles and ships, but in no case is the level of interest low enough to be ignored in SURVIAC planning. Approximately 45% of the responders checked interest in all three categories of target material: U.S., foreign, and NATO. The industry sector showed (as expected) greatest interest in domestic targets; both sectors indicated high interest in foreign targets (73%) and NATO material (48%). Table A-5.2 attempts to discriminate relative interest in targets by considering percent of items (targets) checked, instead of percent of responders checking each item. However, the survey suggests that SURVIAC must address a large variety of targets in order to be completely responsive to the whole S/V community. Table A-5.3 presents the other targets cited by responders: i.e., RPVs, submarines, communications and personnel. However, most of the other write-ins represent specific needs which are implicit in the listed broader target types. Note that the targets cited by the responders also confirm the need for SURVIAC plans to consider a broad scope of targets.

A-6.4.2 Threat Types

Survey responses on threat types of interest were analagous to those above on Target Types of Interest. The responses are presented in Tables A-5.4 and 5.5. Responder interest ranked as follows: (1) nonnuclear, (2) directed energy, (3) nuclear, (4) chemical/biological, (5) natural environmental, and (6) crash/post-crash. For the above, interest ranged from 83% to 17% of the responders, suggesting that all threats must be considered seriously by SURVIAC and/or other centers already in existence. The rank of threat types was the same for both Government and industry (although the industry sector indicated slightly more responders interested in the top ranking threats). The unlisted threats cited by the responders were mainly elements implied in the broad types listed in Question 5; e.g., blast, ballistic, small arms, lasers, fire, secondary damage, etc. However, importance emphasis by the responders is indicated in the detectabilities and in other electromagnetic threats. Some highly specialized threats were also noted, e.g., Have Name, SLUFAE, smoke (obscurants), clandestine. To minimize duplication, it must be remembered that existing information centers already provide some essential S/V data, especially in some threat areas; e.g., DASIAC for nuclear, IRIA for infrared, among others. However, there remains a need for a central focal point such as SURVIAC to insure that all information sources are exploited, and to provide the interface information to the S/V community.

A-6.4.3 Elements of S/V Information

S/V information is utilized in a variety of evaluation procedures for different purposes ranging from the quantification of component vulnerability reduction, to effectiveness of major aerial and surface weapon systems. The various procedures require inputs of a large variety of S/V elements in varying degrees of detail, accuracy, precision, etc. Question 11 addressed a long (but not exhaustive) list of such elements to poll the needs of the overall S/V community. The results are presented in Tables A-5.6 through 5.8. In spite of the long list, responses indicate high interest (i.e., 20 to 80% of the responders) in all the listed items.

While the magnitudes of interest on some items differ between Government and industry responders, there is no apparent overall significance to these differences of opinion. "Other" elements of user need/interest cited (Tables A-5.7 and 5.8) identified a few additional items, but they also emphasize special inputs required for some evaluations.

Essentially, the survey response to this question further illustrates the broad scope of types of data required in a proposed SURVIAC.

A-6.5 PRESENT SOURCES OF S/V INFORMATION

The survey was addressed exclusively to users and/or generators of S/V information, whether fulltime, or only part-time to support other primary missions. Questions 6 and 7 were intended to identify the present user sources of data and to indicate the current extent of their usage. Hence, Question 6 lists the common major sources which should be known and available to all, and Question 7 seeks to identify other less commonly known sources (mainly Government) which are used (or at least known) by a high percentage of the Government and industry responders. However, considering that the survey was addressed exclusively to the S/V community, the responses should have approached 100%, at least for sources like JTCG/AS, JTCG/ME and CDIC which exist primarily to meet this need. This lack of awareness implies that either these sources are not adequately publicized or available enough, or not as effective as they ought to be. In any case, the survey indicates the need for SURIVAC, in order to at least centralize and improve S/V data dissemination.

A-6.6 DESIRED PRODUCTS/SERVICES

An important factor in planning a SURVIAC, is the identification and definition of the Products/Services desired by the S/V community. Question 10 of the survey presents a list of (13) possible products to be ranked according to the responder's need. The list includes some items currently provided through the DTIC, NTIS, JTCG/AS, JTCG/ME and other Government agencies and professional societies: e.g., bibliographies, newsletters, handbooks, consultant directories, symposia, application workshops, standards, current project status reports, etc. The list also includes standard products provided by existing IACs in their assigned technology areas: e.g., state-of-the-art reviews, data books, technology briefs, and others now provided to the S/V users by the JTCG/AS. The responses (including write-ins) are summarized in Table A-7.1 for Government responders and A-7.2 for industry responders. Both sectors agreed on the top four preferences for products/services: (1) quick response to technical inquiries, (2) state-of-the-art reviews, (3) handbook/data books, and (4) current awareness newsletter. These preferences were ranked first choice by about 45% down to 17% of the responders, respectively. Both sectors also agreed on lowest preferences (selected for first choice by less than 9% of the responders): conferences/symposia, application/workshops and training materials. The two sectors did not agree in their preferences for the remaining listed items, i.e., midrankings by 10 to 20% of the responders. These product/service items included current awareness newsletters, bibliographies, technology briefs/notes, standards/practices, current project status, consultants directory/referral and technical journals. However, it should be stated that all the listed items (except

training materials) polled interest by a significant number of responders, regardless of the survey scoring/ranking method. The responder write-ins are also noteworthy. Both sectors (Government/industry) identified the following important unlisted items: a library (of all S/V documents) which is accessible to users; on-line computerized service accessible via terminal; and a local analysis group capable of test data surveys, target threat analyses, specific assessments and modeling. Other important products/services identified by Government responders were: design descriptions data (e.g., weights) and standardized (DoD) data (which, in fact, is a recognized ongoing goal of all tri-Service coordinating groups). Write-in items by industry responders were: threat data books, current and future programs (incl. JTCG), computer codes and programs, an annual reference guide by subject, and booklet on how to get (S/V) information. Some of the above products/services are already available but apparently not sufficiently publicized. Most of the suggested items are intended as essential for SURVIAC or any other IAC

A-6.7 USE OF EXISTING INFORMATION ANALYSIS CENTER (IACs)

SURVIAC consideration is partly due to the acceptance and success of existing IACs. Current plans are to adapt the approaches of these working centers to the proposed SURVIAC. It is also intended for SURVIAC to be a part of the DTIC/IAC network, and to develop strong interfaces, especially with those centers which already disseminate S/V-related information, i.e., DASIAC, GACIAC, IRIA, NTIAC, TACTEC, and others. Computerized tie-in and access via terminal to related data bases at other IACs are an essential feature if SURVIAC is to provide complete services, and for rapid development as a responsive center. The survey presented this issue to the S/V community in Question 8, by listing the twenty existing IACs. Responders were asked to check those which they have used (or with which they are very familiar), and also (in Question 8(b)) whether they considered any of the (IAC) approaches appropriate/adaptable to S/V information. Tables A-8.1 through 8.4 present the findings, including write-in "others" which some responders considered as IACs.

The most disturbing finding was the lack of awareness within the S/V community regarding the existing available resources of the IACs. Sixty-four percent of the Government responders and 50% of the industry responders were not familiar with even one of the (20) IACs. Less than 10% of the total responders were familiar with any single (listed) center, including at least five which have been providing information which is directly related to S/V. From visits to the IACs (Appendix B) it is known that they all serve large technical communities, and all have definite publicity programs, which apparently are not reaching a significant segment of the S/V community. The five most familiar IACs were each checked by 9.8 to 8.8% of the responders. In order, these were DASIAC, IRIA, PLASTEC, CPIA, GACIAC; three of which disseminate data directly related to S/V. Eight of the other centers were each mentioned by only 5.9 to 2.0% of the survey responders: MCIC, RAC, NTIAC, TEPIAC, TACTEC, SVIC, DACS, MMCIAC; at least three of which also disseminate S/V related information. The remaining seven centers together were mentioned by less than 6% of the responders. (However, their technical domains are generally not S/V-related.) It is noteworthy that the industry response shows more familiarity with these centers than the Government response, by a factor of about two, even though all of the listed centers are

sponsored and directed by the Department of Defense. A large number of "other" (unlisted) centers were also identified by both Government and industry responders (see Table A-8.2). While most of these are not strictly IACs, i.e., sponsored by the Defense Logistic Agency (DLA), solely to centralize and disseminate information, nevertheless they represent major S/V information resources to be identified in a viable SURVIAC.

Question 8(b) polled the S/V community opinions specifically on the appropriateness/adaptability of the existing IAC approach(es) to S/V information. While the low level of community awareness is disturbing, the response of those with IAC familiarity was generally favorable. Based on the 215 (30%) responders with Yes or No opinions, the margin was over about 1.5 to 1 by the Government sector, over 3 to 1 by the industry sector, and over 4 to 1 by the responders familiar with two or more IACs (see Table A-8.3). Note that 70% of the total responders, and even 40% of those with IAC familiarity declined to state a yes or no opinion. Those not familiar, generally declined by admitting insufficient knowledge for a judgment. However, among those familiar with some IACs, there was a negligible indication of hesitation on the suitability of the IAC approach for the S/V technology, or their coordination with the proposed SURVIAC. The registered comments are listed in Table A-8.4. Most were favorable, especially for DASIAC, TEPIAC and GACIAC. Very few of the unfavorable responses stated their objections, but some were constructive comments emphasizing the need for a data analysis function in a center for S/V information.

In summary of the survey findings on the IAC approach, the S/V community needs more awareness of the existing IAC resources, but most of the responders familiar with existing centers are favorable with this appoach for a SURVIAC. In the early development of the proposed SURVIAC, coordination with those centers closest to the S/V discipline represents a means of significant immediate service to the S/V community, while other needed technical information is located, centralized and prepared for dissemination. Among these centers are: DASIAC (nuclear), IRIA (infrared), GACIAC (guidance and control) and others already well-established and functioning successfully in technical communities more specialized than S/V.

A-6.8 S/V MODELING INFORMATION

In order to integrate survivability and/or lethality into effectiveness evaluations and trade-off studies, a large variety of models have evolved over the years. Their validation, standardization, and centralization is a subset of the information problem which has plagued the S/V community for many years. This problem surfaced in many of the survey responses. An interim solution to this problem was addressed already last year by the initiation of a "JTCG/AFWAL" S/V Model Respository" at the Battelle Columbus Laboratories. The repository approach is similar to that of the Information Centers, and its operation is proposed as a core element of the final SURVIAC acitivty. The first effort of the Model Repository was a limited survey of the Government/industry model users to identify their needs. Some of the findings are included herein, as relevant to the survey of the whole S/V community. Twenty-three questions surveyed the models used and modeler needs/problems in their utilization. Responses confirmed the need and user desire for a central model repository,

identified the models used most and their sources, identified compatible computers and their required support facilities. Two general findings are most significant to the overall S/V information problem, to the recently proposed SURVIAC, and to the survey herein to confirm its need and define its scope. First, 91% of the responders desired access to a central Model Repository. Secondly, it became "evident that good validated data (for model inputs) are hard to acquire. Aircraft signature (RCS/IRCS), vulnerable areas (A_V) and electronic countermeasures (ECM) data seem to be the three most difficult types of information to acquire". Such needs were confirmed by the more recent SURVIAC survey of a broader segment of the S/V community. These findings further emphasize the need for a SURVIAC. Also, some urgent critical items were identified to be considered in defining the initial scope of a SURVIAC, and in prioritizing initial services to be provided.

A-6.9 DESCRIPTION OF THE SURVEY POPULATION

The survey of the S/V community was intended to cover as broad a representation as possible. Questions 3(b), 13 and 14 were included to describe the background of the responders. Tables A-9.1 through A-9.5 summarize the distribution statistics of: generator/user functions, parent agencies, regular activities, educational disciplines and geographic locations, as represented by the responders. Of the 718 responses analyzed, the distribution between Government and industry responders was mentioned previously, i.e., 343 (48%) Government and 375 (52%) industry – nearly equal representation.

Question 3(b) asked: "Would you characterize yourself as a generator, user, or neither of S/V information?" Less than 5% replied "neither", less than 13% replied "generators solely", 55% replied "users soley" and 28% replied "both users and generator." Hence it can be concluded that survey responses represent user opinions primarily (i.e., 84%), which probably comprises the largest proportion of the community, as well as those with most of the information handicaps. Note in Table A-9.1 that the user/generator distribution is similar within the Government and the industry sectors, with slightly more data generators in Government agencies.

Within the Government, the Navy response was higher (18%) than the Air Force (14%) or the Army (12%). Note that 3.6% of the responders involved other DoD and non-DoD offices/agencies (i.e., OSD, JCS, DIA, DNA, NASA, FAA, CIA and AEC) who are also concerned with S/V information. Hence, the variety of Government agencies appears well represented (but the responses of the individuals should not be construed to represent official positions of their parent agencies, which are listed in Table A-9.2). Note (in Table A-9.1) that each of the Government segments includes similar representations of the user and generators of data. The industry responders represent a variety of contractors from large corporations to single consultants, engaged in the production and/or the evaluation of military materiel of all types. No attempt was made to quantify the distribution(s) within such a wide variety.

Table A-9.3 presents the distribution of the major relevant regular activities represented by responders. Significant groups are: 60% in Research and Development, and 53% in

Analysis (which emphasizes the demand upon SURVIAC for technical analysis capability). Table A-9.4 illustrates the wide variety of educational disciplines within the S/V community. While Mechanical Engineering, Physics and Management rank highest, practically all the other engineering and science specialities are represented. The multi-discipline nature of S/V information poses another planning consideration in communication and staffing for SURVIAC.

Table A-9.5 presents the geographical distribution of the survey responders, which is a factor in selecting the location for the proposed new center. Note the wide distribution of the S/V community throughout the country (including Hawaii and the northwest, not explicitly listed). The two most concentrated sections are the Washington, D.C. area (primarily Government) and California (primarily industry). As expected, both of these areas were suggested potential SURVIAC locations. Compromise for the convenience of most users suggests a site in the mid-west.

In all respects, the 718 survey responders appear to represent the variety and breadth of the whole S/V community. Hence, at least statistically, the survey responses should also represent the needs and desires to be met or considered in planning the proposed SURVIAC.

A-6.10 COMMENTS/QUESTIONS/RECOMMENDATIONS

The questionnaire was intentionally designed to encourage reaction by minimizing the required effort to respond. However, comments and questions were invited in the cover letter, and specifically in Question 16: "COMMENTS (e.g., typical question(s) you might ask of an S/V information center; S/V area of current/greatest interests to you; use additional sheets if necessary)". While the survey statistics measure the problems, needs and desires of the overall S/V community for dissemination of information, the narrative additions suggest the range and depth of interests. The primary purpose was to provide additional user input for planning and organization of the proposed SURVIAC, but it was also intended to encourage participation and support by the potential users. The comments, questions and (unsolicited) recommendation were condensed, organized and listed in Tables A-10.2 through A-10.5. It is believed that such additional information will provide guidance in defining the relative priorities in the phased development of SURVIAC. Note (in Table A-1) that about half of the 718 responders were willing to be contacted for further discussion.

As expected, 504 (70%) of the responders filled out the Questionnaire without further comment. However, 153 specified their areas of interest and/or concern in short comments and/or questions. Fifty-five responders were motivated for further discussion in long comments and/or cover letters of encouragement for SURVIAC; 36 provided unsolicited recommendations.

Most of the recommendations confirm current SURVIAC planning; e.g., the need to publicize available service, the need to standardize data where possible and especially the technical expertise requirements to provide a full-service data analysis capability. A

few are possible oversights in planning to date, i.e., the need to handle informal reports records ordinarily not entered in existing data banks.

The first observation on the invited questions and comments is their large number and variety. Some are perhaps repetitive emphasizing certain needs, but in general the questions bring out the many "shades" of many S/V problems. These are too numerous to discuss, but the reader is strongly urged to scan the long lists (Tables A-10.4 and 10.5). The general similarity of the overall questions from the Government to those from industry is noteworthy. While the technical questions/comments do not uncover any unknown general problem area, they provide more insight into the specific questions facing the S/V community. They certainly add reality to the "cold" survey statistics. Such insight should be valuable guidance in the phased development of SURVIAC.

A-7.0 SUMMARY OF SURVEY FINDINGS

As a whole, the response to the Questionnaire Survey was outstanding. It was addressed to over 4,000 from two mailing lists (JTCG/AS Newsletter, and ADPA Ballistics and Vulnerability Division) in order to reach a broad representation of the S/V information users. Seven hundred and eighteen (17.2%) responded.

In substance, the Questionnaire addressed the following areas:

1. Basic issues of the SURVIAC concept approach.
2. Problems presently encountered.
3. Desired output.
4. Delineation of user interests in targets, threats and S/V technical elements.
5. Present sources of data/information.
6. User preferences in products/services.
7. User awareness and utilization of the existing IACs, and the suitability of the IAC approach to S/V information.

Additional questions were employed to describe the population of Government/industry responders; i.e., regular activity, educational background, geographic distribution, type of organization, user vs. generator of S/V data. These were intended to indicate how the responders represent the variety of interests within the S/V community.

The distribution statistics of the responders demonstrate that the Survey findings are representative of the whole S/V community. Slightly more than half of the responses represented industry users, including major aerospace corporations, many analytical study contractors, as well as individual consultants. Manufacturers of surface weapons and ships are significantly represented, but aerospace emphasis is reflected (influenced by the use of the JTCG/AS mailing list). All four Services are well represented as well as some other (DoD and non-DoD) Government elements. The responders were from 123 different agencies with a wide range of S/V interests, activities and decision levels. The Government and industry sectors were analyzed separately for comparison, but in general, their opinion statistics were nearly identical. The Survey was primarily intended to reach "users" of S/V information, and 82% of the responders identified themselves as such, including 28% who were also "generators" of S/V data. Less than 13% checked that they were solely generators of data (for use by others). The responders represented a wide range of engineering and scientific educational backgrounds, which suggests a need for multi-discipline staffing of SURVIAC. The reported major relevant regular activities were: 60% Research and Development, 31% Management, and 53% Analysis, which emphasizes the demand upon SURVIAC for S/V technical analysis capability. Geographically, the demand for S/V information exists in all areas of the United States, with Government concentration in the Washington, D.C. vicinity and industry concentration in California, suggesting the Mid-West as probably the best compromise for the S/V community as a whole.

Most of the suspected S/V information problems, present sources, types of target, threat types of interest, and desired products/services were confirmed by the response statistics, and by the narrative comments as well. The two worst problems verified were: (1) unavailability and/or inaccessibility of needed information (73% of the responders) and (2) unawareness of available data and methodologies (58%). The other three listed problems were slightly less serious: (3) inconvenient/incomplete form of information (40%), (4) information not oriented/slanted to the (specific) needs (of responders) (34%), and (5) poor quality (unreliable, dated, etc.) information (28%). Write-in problems identified a few other minor problems, but generally verified the above in more detail. Awareness and use of all the present sources of S/V information was demonstrated, and some additional sources were identified for SURVIAC consideration. However, the apparent utilization of major available sources (i.e., JTCG/AS, JTCG/ME, CDIC) was not as high as it should be since this Survey addressed the S/V community exclusively. The current lack of awareness and utilization of the existing Information Analysis Centers, is especially distrubing. However, those aware of IAC performance, confirmed the appropriateness/adaptability of the IAC approach(es) to S/V information, by a margin of four to one. Such responses suggest insufficient publicity of what is available and/or serious deficiencies in the existing data and/or its current means of dissemination, all of which indicate a serious need and urgency for a responsive SURVIAC. In desired products/services, the responses gauged user preferences for the variety of usual means of disseminating technical information, with explicit emphasis on timely responsiveness. In types of data, the responses reflected interest in all targets, threats, and elements of S/V information. This finding suggests the need for a very broad scope of data in SURVIAC, and close ties with the DTIC network, including the other existing centers with demonstrated responsiveness in large subsets of S/V information, e.g., nuclear, detectability, guidance.

The most important parts of the Survey were the "Yes or No" questions on basic SURVIAC issues. Nintety-one percent of the responders confirmed the need for an information center for S/V data, analysis and technology. Eighty-four percent agreed that such a central facility should be chartered as a DoD IAC, and 88% said they would use a central source of S/V information if it were available. On these issues, no significant difference is observed between Government and industry responders.

On the issue of "appropriateness/adaptability of IAC approach(es) to S/V information," 70% declined to respond mainly because of unfamiliarity with IACs, but those who did respond were generally favorable. On the issue of fees to industry for SURVIAC service, 60% stated that nominal fees would not limit use of SURVIAC. The objections primarily involved "red tape" rather than cost.

Perhaps the most important confirmation by the Survey was the responder preference in form of data. "Data with analysis" was selected first choice (of five options) by 60% of the responders, and second choice by an additional 23%. This response clearly identifies the need for a technical data analysis capability, with suitable staff expertise in order for SURVIAC to provide full service.

TABLE A-1. General Response To Survey Questionnaire.

	Government	Industry	Total
ADPA, Ballistics & Vulnerability Division mailing list	---	---	1800
JTCG/AS Newsletter mailing list	---	---	2375
Total Questionnaires mailed out	---	---	4175
Number of responses	343	375	718
Percent responding	---	---	17.2%
Agencies/Companies represented	123	118	241
Invitations for further contact/discussion (YES)	33.8%	49.6%	42.1%
(NO)	32.4%	27.2%	29.7%
Additional comments/questions–responses with no comment	237	267	504
Short (one or two line) notes	72	81	153
Long (additional sheets/letter)	27	27	54
Volunteered recommendations	19	17	36

QUESTION 16: COMMENTS (e.g., typical question(s) you might ask of an S/V information center; S/V area of current/greatest interest to you; use additional sheets if necessary). See Tables A-10.1 through A-10.5.

TABLE A-2. User Opinions Basic Issues[a] (In % of Responders).

Question		Yes (%)	No (%)	Blank (%)
1. Does a need exist for a center for information on S/V data analysis and technology?	GOV.	87.9	6.5	6.6
	IND.	94.6	2.4	3.0
	TOT.	91.4	4.4	4.2
2. Should such a central facility be chartered as a DoD S/V Information Analysis Center?	GOV.	80.2	8.0	11.8
	IND	86.3	3.0	10.7
	TOT.	83.5	5.3	11.2
3(b). Would you use a central source of S/V information if it were available to you?	GOV.	83.6	5.9	10.5
	IND.	92.3	2.1	5.6
	TOT.	88.1	3.9	8.0
8(b). Do you consider the approaches of any of these (existing Information Analysis Centers–IACs) appropriate/ adaptable to S/V information? (See Tables A-8.1 through A-8.3)	GOV.	12.9	9.2	77.9
	IND.	29.0	8.1	62.9
	TOT.	21.2	8.6	70.2
15. Establishment of a SURVIAC under the auspices of DoD with the mission scope previously described, will require assessment of nominal fees for selected services to industry. Would this limit the use of the SURVIAC? (Objections listed in Tables A-10.1)	GOV.	25.9	56.8	18.3
	IND.	26.5	62.5	11.0
	TOT.	26.2	59.8	14.0

[a]Number of Responders: 343 Government + 375 Industry = 718

TABLE A-3.1. S/V Information Problems Encountered Regularly (In % of Responses).

Problems	Government	Industry	Rank
Needed information unavailable/ existent/difficult to locate	71.7	75.2	1
Unaware of available technical/analytical information and methodologies	54.5	61.1	2
Inconvenient/incomplete form of information	34.4	45.6	3
Information not oriented/slanted to my needs	37.0	31.2	4
Poor quality (unreliable, dated, etc.) information	25.4	31.5	5
Other (write-ins)[a]	8.4	10.9	6

QUESTION 9: Which of the (above) problems do you regularly encounter with respect to S/V information? (Multiple problems were checked by most responders.)

NUMBER OF RESPONDERS: 343 Government + 375 Industry = 718

[a] See Tables A-3.2 and A-3.3.

TABLE A-3.2. Other (Unlisted) Problems Encountered With S/V Information (By Government).

Code	Problem Cited	Problem Class
8	Dated information	Poor Quality
174	No documentation	Poor Quality
174	Improper documentation	Poor Quality
193	Poorly planned S/V	Poor Quality
310	Incomplete information	Poor Quality
362	Biased, i.e., slanted to prove preconceived position	Poor Quality
8	Changes in intelligence data	Poor Quality
101	Contradictory intelligence data	Poor Quality
510	Threat not specific; conflicting conclusions	Poor Quality
547	Data inconsistent; unaccepted/ approved by community	Poor Quality
575	Documentation not up to date	Poor Quality
595	Lack of confidence in realism and threat definition input	Poor Quality
369	Slow delivery	Accessibility
154	Security	Accessibility
384	Accessibility	Accessibility
396	Poor communications	Availability
396	Willful competition; cost	Availability
186	No common frame of reference	Standardization
533	Need for single DoD coordinated, validated product	Standardization
119	Terminology	Standardization
596	Redundancy of information systems	Standardization
701	Incomplete documentation to support information	Standardization

RESPONDERS: 343
PROBLEMS CITED: 22

TABLE A-3.3. Other (Unlisted) Problems Encountered With S/V Information (By Industry).

Code	Problem Cited	Problem Class
23	Retention of critical classified reference data	Availability
33	Limited distribution information to Government only	Availability
208	Government will not release	Availability
210	Unduly restricted	Availability
212	Unwillingness	Availability
259	No funds for S/V maintenance	Availability
267	Super classified (boxed)	Availability
270	Need-to-know procedure often too complex	Availability
277	Security boxes	Availability
285	Loss of time in justification "mill"	Availability
411	Government/industry barriers–non cooperation	Availability
442	Need-to-know response	Availability
458	Delays in locating data and authorization for access	Availability
629	Government/industry barriers–non cooperation	Availability
642	Hard to get data	Availability
656	Controls on data	Availability
661	Government specifications (for release of data)	Availability
808	Difficult to obtain–sources uncooperative	Availability
215	Too long to acquire	Availability
287	Time lag between data generation and availability	Availability
410	Information old	Availability
803	Unavailability for timely response to RFPs	Availability
833	No funding/resources to generate information	Availability
271	DTIC search has no S/V references; poor key words	Accessibility
436	Need personal copy attention by direct mail	Accessibility
466	Information scattered in many sources and documents	Accessibility
610	Service libraries have reports not in DTIC–some of them have limited indexing–makes reports difficult to acquire	Accessibility

TABLE A-3.3. Other (Unlisted) Problems Encountered With S/V Information (By Industry) (Cont'd.).

Code	Problem Cited	Problem Class
669	Not centralized	Accessibility
226	Conflicting data, uncertain, unvalidated	Poor Quality
277	Inadequate analysis	Poor Quality
428	Incorrect basic data	Poor Quality
461	Inconsistency among sources	Poor Quality
463	No agreement on methodology for vulnerability calculation	Poor Quality
490	Threat information not up-to-date	Poor Quality
615	Unvalidated information—no agreeement among methodologies	Poor Quality
801	Experiment environmental conditions not controlled	Poor Quality
811	Conflicting data analysis and results. Data not reliable	Poor Quality
818	Information often limited in scope and without sufficient methodology to generalize	Poor Quality
838	Do not have current methodologies/threat data base	Poor Quality
454	Few methodologies are suitable for preliminary design of out-year system. Further, the analysis of subsystems depends upon total system description which is hard to acquire	Poor Quality
655	R&D technical community's lack of appreciation for the operational environmental (human factors)	Poor Quality
846	Security restrictions, need-to-know	Poor Quality

RESPONDERS: 375
PROBLEMS CITED: 42

TABLE A-4.1. Desired Form of Data--Preference (In % of Total Responders).

Desirable Form	Rank Choice				
	First	Second	Third	Fourth	Last
1. Data with analysis	60.2	23.3	5.8	2.9	7.8
2. Data with comments	37.8	40.3	12.3	1.5	8.2
3. Flexibility in data formats	15.1	23.3	22.6	15.4	23.6
4. Topical data sources only	9.8	15.7	24.2	26.7	23.6
5. Raw data identification only	6.3	10.4	21.2	36.1	26.0
6. *Other (write-ins)*[a]	2.6	0.2	0.0	0.5	96.7

QUESTION 12: Desirable form of S/V information (rate items chosen from 1 (the most important) to 4 (the least important)). Rate all items. (Last choice was presumed for all items not rated.) Some items were ranked equal by some responders.

TOTAL RESPONDERS: 718

[a] See Table A-4.4.

TABLE A-4.2. Desired Form of Data–Preference (In % of Government Responders).

Desirable Form	Rank Choice				
	First	Second	Third	Fourth	Last
1. Data with analysis	63.2	20.3	6.4	3.0	7.1
2. Data with comments	35.6	40.2	14.6	0.8	8.8
3. Flexibility in data formats	21.0	29.4	22.2	12.7	14.7
4. Topical data sources only	8.7	17.0	24.5	25.7	24.1
5. Raw data identification only	8.9	9.3	20.4	33.7	27.8
6. Other (write-ins)[a]	1.5	0.0	0.0	0.8	97.7

QUESTION 12: Desirable form of S/V information (rate items chosen from 1 (the most important) to 4 (the least important)). Rate all items. (Last choice was presumed for all items not rated.) Some items were ranked equal by some responders.

GOVERNMENT RESPONDERS: 343

[a]See Table A-4.4.

TABLE A-4.3. Desired Form of Data–Preference (In % of Industry Responders).

Desirable Form	Rank Choice				
	First	Second	Third	Fourth	Last
1. Data with analysis	57.5	26.1	5.2	2.8	8.4
2. Data with comments	39.4	40.3	10.5	2.1	7.8
3. Flexibility in data formats	10.5	18.8	22.5	17.8	30.4
4. Topical data sources only	10.5	15.0	24.3	27.2	23.0
5. Raw data identification	4.2	11.5	22.0	38.0	24.3
6. Other (write-ins)[a]	3.8	0.3	0.0	0.3	95.6

QUESTION 12: Desirable form of S/V information (rate items chosen from 1 (the most important) to 4 (the least important)). Rate all items. (Last choice was presumed for all items not rated.) Some items were ranked equal by some responders.

INDUSTRY RESPONDERS: 375

[a] See Table A-4.4.

TABLE A-4.4. Desired Form of Data–User Cites Unlisted on Question 12.

Code	Write-ins
	By Government Responders
150	Current vulnerability models
313	Data with design guidelines
364	Data sorted by target description
384	Computer compatible
396	Procedure for collection, confidence
551	Collated published handbooks
595	Data with comments including confidence (particularly in probabilities and assumptions)
596	Technical interchanges with analysts
	By Industry Responders
23	Collated test data, shot by shot
202	Analytical comparisons
259	Mission analysis with comments
428	Serial number and history of components used in configuration management
432	Sources for follow-up
454	Availability of first-hand reports concerning actual casualties (this is usually not allowable for personnel casualties)
461	IAC goal to have centers open to visitors for contact with staff for latest information
498	Digested data, tutorial texts, catalog of available information
634	Timely
645	Material survivability properties and rankings
652	Honest complete listings of data measurement methods, etc.
655	Compatible with joint use of industry-wide models
656	Raw data available upon request
690	Target/threat catalog
838	We generate S/V information if/when needed

TABLE A-5.1. Target Types of Interest (In % of Responders).

Target Type	Government	Industry
Part A		
Aerial		
Fixed wing	79.9	77.9
Rotary wing	63.6	54.9
Missiles	63.0	72.8
Others[a]	8.4	10.4
Surface (land)		
Vehicles	48.1	60.5
Facilities	36.4	42.9
Structures	35.9	43.2
Others[a]	4.1	3.5
Ships	39.4	64.0
Space	27.7	34.4
Other[a]	8.8	10.7
Part B		
U.S. Materiel	61.2	94.1
Foreign (enemy)	80.2	72.8
NATO	51.9	48.0
All three	(43.7)	(45.9)

QUESTION 4: What types of targets are you interested in? Most responders indicated multiple target types.

NUMBER OF RESPONDERS: 343 Government + 375 Industry = 718

[a]See Table A-5.3

TABLE A-5.2. Target Types of Interest (In % of Total Items Checked).

Target Types	Government	Industry	Total
Part A			
Aerial	(52.0)	(44.9)	(47.7)
Fixed wing	19.5	16.2	17.5
Rotary wing	14.9	11.7	12.9
Missiles	15.4	14.8	15.1
Others[a]	2.2	2.2	2.2
Surface (land)	(29.5)	(31.8)	(30.8)
Vehicles	10.9	12.9	12.0
Facilities	8.9	9.0	9.0
Structures	8.8	9.2	9.0
Other[a]	0.9	0.7	0.8
Ships	9.9	13.9	12.4
Space	6.3	6.8	6.6
Other[a]	2.3	2.6	2.5
Part B			
U.S. Materiel	26.9	44.4	37.5
Foreign (enemy)	44.8	33.2	37.8
NATO	28.3	22.4	24.7
All three	(42.4)	(46.9)	(44.9)

QUESTION 4: What types of targets are you interested in? Most responders indicated interest in more than one target type.

RESPONDERS: 718
ENTRIES: 3040

AVERAGE NUMBER OF TARGET TYPES PER RESPONSE: 4.2

[a] See Table A-5.3.

TABLE A-5.3. Unlisted Target Types Cited By Responders.[a]

Target Type Cited	Number of Mentions	
	Government	Industry
Aerial	(17)	(15)
VSTOL	1	1
RPV, drone, decoys	12	8
Lighter-than-air, glide weapons	2	
Propulsion components (engines, rocket motors, APU)		3
Mission equipment (avionics, RADOMES, EW, guns)	1	
Cruise missiles	1	2
Surface (land)	(15)	(19)
Vehicles (tanks)	1	5
Facilities (air fields, Army Materiel, field equipment)	1	2
Structures (shelters, silos, piers, wharves, bridges)	3	4
Weapon systems (AAA, SAM, air defense, radars)	4	5
Surface weapons	2	1
Munitions (explosives, fuzes, Arming, chemical warheads, nuclear warheads)	4	3
Ships		
Underwater (submarines, torpedoes, mines)	(9)	(6)
Space		
Satellites, reentry vehicles, weapons terminals	(7)	(3)
Other	(12)	(6)
Communications (C_3I, C_3, ADP, computers)	7	5
Personnel	4	1
Misc. (sub-scale targets, armor materials)	2	
RESPONDERS: 718		

[a]QUESTION 4 Write-ins.

TABLE A-5.4. Threat Types of Interest (In % of Responders).

Threat Type	Government	Industry
Nonnuclear	82.5	83.2
Directed energy	64.7	70.9
Nuclear	40.5	40.0
Chemical/biological	50.2	54.7
Natural/environmental	26.5	27.4
Crash/post crash	17.8	15.7
Other (write-ins)[a]	9.0	8.3

QUESTION 5: What types of threats are you interested in? Most responders checked multiple threats.

NUMBER OF RESPONDERS: 343 Government + 375 Industry = 718.

[a] See Table A-5.5.

TABLE A-5.5. Unlisted Threat Types Cited by Responders.[a]

Threat Type	Number of Mentions	
	Government	Industry
Vulnerability (damage)	(11)	(8)
Blast, shock, flame, mines	3	1
Fire/explosion (fuel, ammunition, other)	3	1
Secondary damage (engines, self-generated)		2
Rust, dust, rocks, lightning, static	3	3
other (Have Name, SLUFAE, Clandestine)	2	1
Detectability	(8)	(2)
Acoustic, optical, radar, microwave	4	1
Reconnaissance, sensors, decoys	2	1
Camouflage, obscurants (smoke)	2	
Electromagnetic	(8)	(11)
EW, ECM, ECCM, semi-ECM	3	8
EMP, EMI, EMC, EMR	5	3
RESPONDERS: 718		

[a]QUESTION 5: Write-ins.

TABLE A-5.6. Elements of User Need/Interest in S/V Information (% of Responders).

S/V Element	Government	Industry	Rank
Threat data	79.3	63.7	1
Test data/results	58.6	66.9	6
Vulnerability assessment	71.7	72.0	2
Failure/damage modes	49.3	61.9	8
P(K/H) functions	75.8	55.7	5
Combat/field data	41.1	41.9	17
Vulnerability indices	30.6	34.9	22
Battle damage repair	20.7	25.3	24
Susceptability	54.8	54.4	10
Detectable signatures	49.8	49.6	13
Threat detection	49.8	48.3	15
Countermeasures	53.9	53.3	11
One-on-one engagement	37.6	39.1	19
Vehicle	39.1	40.5	18
Models/methodology	51.9	61.6	7
Target descriptions	74.3	58.9	4
Vulnerability	73.5	64.3	4
Lethality	45.8	54.1	9
Susceptibility	45.2	65.6	7
End game	25.1	36.3	23
Trade-offs (opportunity cost analysis)	36.4	41.6	20
Mission effectiveness	46.1	50.9	14
Attrition	32.0	44.5	21
Mission scenarios (Force-on-force–campaign analysis)	43.7	43.7	16
Other (write-ins)[a]	4.7	4.8	25

QUESTION 11: Which of the (above) elements of S/V (information) best describe your interests and needs?

TOTAL ITEMS CHECKED: 8550
RESPONDERS: 343 Government + 375 Industry = 718

[a] See Tables A-5.7 and A-5.8.

TABLE A-5.7. Unlisted Elements of User Need/Interest Cited[a] by Government Responders.

Code	Element Cited
5	Human capability/limitations
101	Rigorous threat system definition
116	Engine design information
119	Time dependent relations of encounters
164	Operational tests vs. threats
183	Threat data very much needed
396	Tactics and human engineering
510	C^3 vulnerabilities
540	Blue on Red
546	CAD missions planning for aircraft
547	Integrated combat models and analyses
568	Synergistic effects
569	Facilities/protective structures/C^3
590	Non-combat in-service and accident data
596	Electronic warfare vulnerability/susceptibility
725	Engine component vulnerability

[a]*QUESTION 11: Write-ins.*

TABLE A-5.8. Unlisted Elements of User Need/Interest Cited[a] by Industry Responders.

Code	Element Cited
23	S/V test methods, instrumentation and simulation
33	Balance of errors
202	Intelligence information
209	Tactical scenarios
269	Effects (on vehicle) of attacking weapon delivery equipment
466	Tactics
467	Ship design
468	Effectiveness
469	Cost
470	Survivability trade-offs
622	SAM firing doctrines
636	Susceptibility, compatibility among spectral regions
645	Observables reduction
835	Vulnerability assessment of airframe structures
838	Environmental effects; threat system inventory
844	Cost effectiveness (enhance survivability vs. proliferation)
845	Hardening

[a]QUESTION 11: Write-ins.

TABLE A-6.1. Present Sources of S/V Information (In % of Responders).

S/V Information Sources	Government	Industry	Total	Rank
DoD documents (DTIC)	71.7	81.3	76.7	1
Army	52.8	50.7	51.7	4
Navy	58.3	80.0	69.6	2
Air Force	53.9	58.1	56.1	3
JTCG/ME	26.2	27.7	27.0	11
JTCG/AS	38.5	35.7	37.1	8
CDIC	11.1	9.9	10.4	13
Industry publications	27.4	36.8	32.3	9
Handbooks/data books	55.1	48.5	51.7	5
Conference papers	42.0	56.3	49.4	6
Seminars/workshops	37.0	49.6	43.6	7
Newsletters/bulletins	15.2	41.1	28.7	10
Other (write-ins)[a]	14.6	10.7	12.5	12

QUESTION 6: What are your current major sources of S/V information among those listed (above)? Multiple sources reported. Total Sources Checked: 3865

AVERAGE NUMBER OF SOURCES PER RESPONSE:
GOVERNMENT: 4.8
INDUSTRY: 5.9
TOTAL: 5.4

[a] See Tables A-6.2 and A-6.3

TABLE A-6.2. Present Data Sources Not Listed (In Question 6). (Write-ins by Government/Industry Responders).

Sources	Number of Mentions	
	Government	Industry
Information Analysis Centers (IACs): GACIAC, IRIA/ERIM, CINDAS/TEPIAC, CPIA BATTELLE, SVIC, DASIAC, TACTEC	5	14
Joint Service Groups: JTCG/ME Handbooks, JMEM, JCMPO, RATSCAT JANNAF, ALNNO	8	3
Intelligence Agencies: DIA, CIA, MIA, FTD, FSTC, FIO, NISC NADIC, Sov. Ship Vul. P.O.	34	12
USAF Labs/Agencies: AFWL (Eglin), AFTEC, ASD, Rome ADC, USAF-XOX Attrition Data Base, CDIC	8	6
USA Labs/Agencies: AMSAA, ARRADCOM, BRL, AVRADCOM, ATL AMMRC, Corps of Engineers, USAREUR, WSMR	21	10
USN Labs/Agencies: NWC, NSWC (Dahlgren) NSDRC, (PMS-405 SAI Data Base) CNA Doc. Ctr., NAVSAFCEN, Fleet Tech. Libraries and files, NAVTIC	13	8
Other DoD Labs/Agencies: DARPA HALO Lib., NCAA Attrition Data Base, DNA, DoD Environmental Data Bank, Aegis Data Enter	5	9
Other Government Labs/Agencies: DTNSRND, DOE National Labs., NASA, SANDIA	16	5
Other Labs/Agencies: Gen. Dyn, McD-D, Lincoln, GE, Lockheed MSC, DIALOG Data base	4	5
Societies/Associations: ADPA, MORS, SAE, IEEE, AIAA, AHS, AUSA, AAAA	8	17
Foreign: AGARD, TTCP, RAE, Scientific Literature, NATO working parties 61 and 84, JANES	9	2

TABLE A-6.2. Present Data Sources Not Listed (In Question 6) (Write-ins by Government/Industry Responders). (Contd.)

Sources	Number of Mentions	
	Government	Industry
Open Literature: Consultants, Contracts, Meetings, Tech. Reports.	6	8
In-House:	4	5
TOTALS:	141	104

QUESTION 7: What data bases and/or information centers and/or sources of data (other than the Defense Technical Information Center (DTIC) and National Technical Information Service (NTIS)) do you currently deal with to obtain S/V data? Include U.S. and foreign scientific and technical society published and unpublished minutes, papers and proceedings.

TABLE A-7.1. User Preference of Products/Services for S/V Information Needs (% of Government Responders).

Product/Service	Rank of Need				
	First	Second	Third	Fourth	Last
1. Quick response to technical inquiries	45.3	19.0	9.5	1.9	24.3
2. State-of-the-art reviews	39.9	21.3	9.9	3.8	25.1
3. Handbooks/data books	27.8	23.2	14.5	6.5	28.1
4. Current awareness newsletter	17.4	35.9	9.4	7.0	30.3
5. Technology briefs/notes	16.4	23.0	14.5	3.1	43.0
6. Current project status	11.7	19.5	10.2	9.0	49.6
7. Standard practices	9.4	14.8	13.3	13.3	49.2
8. Current awareness bibliographies	8.7	15.6	14.5	10.5	50.7
9. Consultants directory/referral	7.9	13.3	15.3	13.3	50.2
10. Conferences/symposia	6.2	22.2	12.8	14.8	44.0
11. Application workshops	5.1	19.5	14.5	11.7	49.2
12. Training materials	5.1	6.6	10.6	20.3	57.4
13. Technical journals	4.9	18.0	16.3	11.8	49.0
Other (write-ins)[a]	2.0	0.4	1.2	0.0	96.4

QUESTION 10: Which of the (above) products/services best satisfy your S/V information needs (rate each item chosen from 1 (the most important) to 4 (the least important)? Choose as many as applicable.

TOTAL ITEMS CHECKED: 4350
RESPONDERS: 343

[a] Library (with originators of data)
Surveys of test data for special systems
Design description/data (i.e., weights)
Standardized (DoD) data
Modeling
Local analysis group
Specific assessments
Computer access via terminal

TABLE A-7.2. User Preference of Products/Services for S/V Information Needs (% Industry Responses).

Product/Service	Rank of Need				
	First	Second	Third	Fourth	Last
1. Quick response to technical inquiries	41.8	23.3	8.5	4.2	22.1
2. State-of-the-art reviews	39.2	23.4	12.0	6.9	18.6
3. Handbooks/data books	35.7	28.0	10.0	3.8	22.4
4. Current awareness newsletters	18.1	24.6	12.9	8.8	35.7
5. Current awareness bibliographies	16.3	24.5	14.2	9.7	35.4
6. Standards/practices	12.4	14.0	14.3	13.3	46.0
7. Technology briefs/notes	11.5	29.5	17.1	7.5	34.4
8. Technical journal	11.9	18.9	17.6	11.3	40.3
9. Current project status	10.4	18.1	12.0	12.3	47.2
10. Conference/symposia	8.8	22.6	20.1	13.5	34.9
11. Consultants directory/referral	7.3	14.5	13.2	19.3	45.7
12. Application/workshops	5.3	17.8	13.5	13.1	50.3
13. Training materials	0.9	7.3	11.1	22.8	57.9
Other (write-ins)[a]	3.2	0.0	0.0	0.3	96.5

QUESTION 10: Which of the (above) products/services best satisfy your S/V information needs (rate each item chosen from 1 (the most important) to 4 (the least important)? Choose as many as applicable.

TOTAL ITEMS CHECKED: 5370
RESPONDERS: 375

[a] Central reference library
Booklet on how to get information
Threat data books
Current and future programs include JTCG
Annual reference guide by subjects
computer codes and programs
On-line access via terminal
Target/threat analyses/calculations
Computation and analytic comparisons
Operator problems (ships).

TABLE A-8.1. Past Usage of Information Analysis Centers (IACs) – (% of Responders).

Center	Acronym	Government	Industry	Total
1. DoD Nuclear Information Analysis Center	DASIAC	5.5	8.2	9.8
2. Infrared Information Analysis Center	IRIA	6.7	11.5	9.2
3. Plastics Technical Evaluation Center	PLASTEC	8.5	9.1	8.8
4. Chemical Propulsion Information Agency	CPIA	5.0	12.3	8.8
5. Tactical Weapons Guidance and Control Information Analysis Center	GACIAC	5.0	12.3	8.8
6. Metals and Ceramics Information Center	MCIC	3.5	8.3	6.0
7. Reliability Analysis Center	RAC	4.1	8.0	6.1
8. Nondestructive Testing Information Analysis Center	NTIAC	2.9	7.5	5.3
9. Thermophysical and Electronic Information Analysis Center	TEPIAC	2.9	5.6	4.3
10. Tactical Technology Center	TACTEC	3.2	4.8	4.0
11. Shock and Vibration Information Center	SVIC	2.6	3.7	3.2
12. Data and Analysis Center for Software	DACS	1.2	4.8	3.1
13. Metal Matrix Composites Information Analysis Center	MMCIAC	0.9	2.7	1.8
Others Listed (7)	--	5.5	5.1	5.3
None of the Above	--	63.8	50.4	56.8

RESPONDERS TO QUESTION 8(a) Which of the (above existing Information Analysis Centers have you used (or are very familiar with)?

RESPONDERS 718

TABLE A 8.2. Numbers of Responders Aware of Existing Information Analysis Centers (IAC).

Number of Familiar Centers	Government	Industry	Total
None of listed centers	244	217	461
One or more centers	99	168	267
Two or more centers	46	92	138
Three or more centers	17	58	75
Four or more centers	5	31	36
Five or more centers	5	18	23
Ten or more centers	1	5	6
Others (unlisted)[a, b]	19	18	36

QUESTION 8(a): Which of the (twenty listed) existing Information Analysis Centers have you used (or are very familiar with)?

NUMBER OF RESPONDERS: 343 Government + 375 Industry = 718

[a]Write-ins by Government: ASIAC, CDIC, FSTC, FTD, NISC, MIA, GIDEP, STAR, AFTEC, CNA, FLECTAC, SAI (Navy Laser D.B.), NCAA Attrition D.B.

[b]Write-ins by Industry: ASIAC, NMIAC, FLETAC, GIDEP, AMMRC, NARDIC, NEARC, ECAC, NAVSTIC, SAES, COMPAT, SSVP, SAC, Recon CIS, LRS, DIALOG.

TABLE A-8.3. Suitability of Information Analysis Center Approaches to S/V Information.[a]

	Responders (number)	Yes (percent)	No (percent)	Blank (percent)
Entire Poll				
Government	343	13	9	78
Industry	375	29	8	63
Total	718	21	9	70
Familiar With				
One or more IACs	267	41	15	44
Two or more IACs	138	50	12	38
Three or more IACs	75	53	13	33
Four or more IACs	36	50	14	36
Five or more IACs	23	33	22	48

QUESTION 8(a): Do you consider any of the approaches of any of these centers appropriate/adaptable to S/V information? *Comments: see Table A-8.4.*

[a]Comments and Reasons Pro and Con: See Table A-8.4.

TABLE A-8.4. Comments Pro/Con on Suitability of IAC Approaches.

Code	Comment: Suitable (Yes)
G-158	(S/V) is not in current data bases (of DASIAC, TEPIAC, MCIC, et. al.)
G-313	When need for information arises, seldom time to solicit centers.
G-365	Should be user/operator oriented versus analyst oriented.
G-396	Must know what you want and how to use it.
G-564	DASIAC can handle all nuclear-related data, but is not set up to handle nonnuclear data.
G-576	DASIAC is the current repository of the Threat Nuclear Forces Survivability, Security and Safety ($TNFS^3$) data base.
G-725	IRIA
G-735	Locate at WPAFB based on prior operational experience of CDIC.
I-33	Should be operated by Government, not by contractor.
I-34	Should be tied to DASIAC, for S/V coordination of nuclear with nonnuclear.
I-219	Provided classified material is included.
I-223	For individuals working alone.
I-254	TEPIAC best estimates are noteworthy.
I-412	But not complete and systematic (re: DASIAC, RAC).
I-451	(SURVIAC) must be to fit S/V center.
I-457	Coordination existis in nature and conduct of operations (DACS, NTIAC, RAC).
I-458	DASIAC
I-474	GACIAC is set up; information retrieval system usable for S/V.
I-491	DASIAC proved helpful.
I-492	DASIAC very effective.
I-610	DASIAC has extensive S/V file.
I-633	CPIA provides good bibliographies, searches, reviews for propulsion topics.
I-654	Should not compete with industry.
I-656	DASIAC has maximum accessibility.
I-667	Impact and threats would require integration of technologies.
I-684	The (IACs) have never identified all key references (DASIAC, GACIAC).
I-809	TEPIAC appropriate–adaptable.
I-815	TEPIAC
I-823	DASIAC sometimes has good information particularly in $TNFS^3$ program.
I-826	System by system approach seems feasible.
I-846	CPIA data base approach is appropriate.
I-853	DASIAC
I-859	Must be automated.

TABLE A-8.4. Comments Pro/Con Suitability of IAC Approaches (Contd.).

Code	Comment: Suitable (No)
G-8	S/V information changing; therefore, only originators can judge it.
G-112	IACs lack capability in (S/V) for technical analysis and interpretation (GACIAC, SVIC).
G-527	Too much random data (IRIA, TACTEC).
G-573	Membership not desirable because of manpower and dollar drain; gain in information obtained not proportional to support cost.
G-727	Appears to duplicate part of AFWEC analysis mission.
I-291	DASIAC should be expanded.
I-463	Dissemination?
I-487	Never heard of IACs in 30 years; must advertise better.
I-668	A facility devoted only to S/V is needed.
I-811	Not unless all data agree without conflict.
I-839	This procedure involves considerable elapsed time, and there is uncertainty as to what information we will get, and when.
	Unfamiliar With IACs (No Opinion)
G-6	How about pamphlet discussing information capabilities?
G-113	Questionable? (IRIA, DASIAC, TEPIAC, MCIC, MPDC, RAC, TACTEC).
G-318	Unfamiliar with IACs. Would like to know what, where, how they operate.
G-549	"Need-to-know" prevents circulation to working levels.
I-637	Acronyms not recognized.
I-645	Need specific data for decision trade off.
N.B.	(Typical comments from the many who were unfamiliar with the Information Analysis Center) See Tables A-8.2 and 8.3.

QUESTION 8(b): Do you consider any of the approaches of any of these centers appropriate/adaptable to S/V information? Comments.

TABLE A-9.1. Distribution of Data Users/Generators Among the Responders (In % Reponders).

	Users	Both	Generators	Neither	Total
Total Survey	54.8	28.4	12.2	4.6	100.0
Industry	57.3	32.8	6.4	3.5	52.2
Government	51.9	23.6	18.7	5.8	47.8
Navy	22.4	8.8	6.4	0.6	18.2
Air Force	15.4	6.1	6.1	2.6	14.5
Army	9.6	7.0	5.2	2.3	11.6
Others[a]	4.4	1.8	0.9	0.3	3.5

QUESTION 3(b): Would you characterize yourself as a--generator, --user, --neither of S/V information?

NUMBER OF RESPONDERS: 343 Government + 375 Industry = 718

[a]DoD: OSD, JCS, DIA, DNA
Non-DoD: NASA, CIA, LIVERMORE, FAA

TABLE A-9.2. Types of Agencies/Companies Represented by the Responders.

Type of Agency/Company	No.[a]	Responders	
		Average No.	Total No. [a]
1. Navy R&D Laboratories	13	1 - 14	67
2. Navy Commands/Staff	14	1 - 9	23
3. Navy Field Users/Others	15	1 - 3	22
4. Marine Corps	4	1 - 2	6
5. Army R&D Laboratories	13	1 - 9	32
6. Army Materiel Commands	9	1 - 15	32
7. Army Field Users/Others	6	1	6
8. USAF R&D Laboratories	10	1 - 9	34
9. USAF Commands/Staff	4	1 - 6	14
10. USAF Field Users/Others	11	1 - 3	16
11. Other DoD R&D	4	1 - 2	8
12. Other DoD Staff	5	1 - 3	7
13. Intelligence Agencies (All)	6	1 - 3	12
14. Other Government	5	1 - 3	9
Total Government	(123)	---	---
15. Major Aerospace Corporations	24	1 - 5	124
16. Other Major Defense Companies	15	1 - 6	37
17. Smaller Defense Companies	16	1 - 2	21
18. Study/Analysis Companies	29	1 - 8	56
19. Consultants	27	1	27
Total Industry	(118)	---	---
Total	241		

[a] Approximated solely to illustrate the variety covered by the survey responses.

TABLE A-9.3. Relevant Regular Activity of Responders (%).

Activity Areas	Government	Industry	Total
Research and Development	59.2	61.6	60.4
Design	18.4	40.8	31.1
Management	32.3	29.1	30.6
Test	25.7	27.2	26.5
Analysis	48.7	57.1	53.1
Other[a]	9.6	5.1	7.2

RESPONDERS TO QUESTION 13: Which of the (above) areas best describe your regular work activities or emphasis relevant to S/V technology? Some responders checked multiple areas.

AVERAGE NUMBER OF AREAS CHECKED PER RESPONSE: 2.0
TOTAL ENTRIES: 1450
RESPONDERS: 718

[a]Write-ins.

TABLE A-9.4. Educational Background of Responders (%).

Background	Government	Industry	Total	Rank
ENGINEERING				
Mechanical	34.1	40.8	37.6	1
Electrical/Electronic	21.9	21.9	24.0	4
Aeronautical/Aerospace	10.8	8.3	9.5	10
Chemical	2.3	2.7	2.5	12
Material	1.2	0.3	0.7	20
Marine/Naval/Nuclear	0.6	1.1	0.8	18
Civil	2.9	3.2	3.0	15
SCIENCE				
Ballistics	6.0	12.3	9.3	8
Physics	26.5	27.5	27.0	2
Chemistry	9.9	8.0	8.9	9
Bio/Med/Human Factors	6.4	1.3	3.8	14
Physical Science	12.0	10.7	11.2	7
Mathematics	20.1	20.2	20.2	5
Statistics	0.3	0.5	0.4	21
Ops. Res./Syst. Anal.	5.8	6.1	6.0	11
Computer Science	12.0	12.0	12.0	6
Safety Science	2.6	3.7	3.2	13
Library Science	0.9	2.7	1.8	17
OTHER				
Management	21.9	27.2	24.6	3
Business/Economics	1.5	2.1	1.8	16
Pilot	0.1	0.3	0.6	19

RESPONDERS TO QUESTION 14: Which of the (above) disciplines best describe your educational background? Some responders checked multiple backgrounds.

TOTAL ENTRIES: 1700
RESPONDERS: 718

TABLE A-9.5. Geographic Distribution of Responses (%).

Location	Government	Industry	Total
DC, MD and VA	47.8	16.8	31.7
Northwest	12.7	18.2	15.6
Midwest	17.1	15.5	16.3
South	5.3	7.9	6.6
Southwest	5.9	9.2	7.6
Far-West	11.2	32.3	22.2
RESPONDERS: 718			

TABLE A-10.1. Cited Objections to Nominal Fee for S/V Information Products/Services to Industry.

Code	Comments and/or objection (from industry only).
I-458	Such services are cut first in hard times.
I-240	Absolutely useless.
I-240	MCIC good, but cost prohibitive for most work.
I-260	Fee may limit responsiveness of SURVIAC.
I-490	Subscription cost hard to justify for small budgets some years.
I-672	A more stable income would be annual user dues.
I-813	Yes, unless fees are limited to charges for reproduction only.
I-475	Depends on economy, business situation and war threat.
I-34	How much is user willing to pay?
I-647	(Fees) Would require appproval of information department.
I-610	Not for us, yes for others–helpful.
I-808	No, except on direct Government contract.
I-650	No if externally funded.
I-226	660, 243, 833 Qualified–maybe–it could–don't know.
I-821	Define nominal?
I-416	Depends on definition of nominal.
I-279	280, 443, 444 Limitation depends on fee/cost.
I-466	604, 615, 644 Limitation depends on fee/cost.
I-420	235, No; as long as cost is reasonable–No, it nominal.
I-474	No, most IACs have assessment fees.
I-451	Keep out freeloaders, do a better job.
I-858	No, if within reason.

QUESTION 15: Establishment of a SURVIAC under the auspices of DoD with the mission scope previously described will require assessment of nominal fees for selected services to industry. Would this limit the use of the SURVIAC?

TOTAL INDUSTRY RESPONDERS: 375
COMMENTS: 32
YES: 27%
NO: 62%
NO OPINION: 11%

TABLE A-10.2. Volunteered Recommendations by Government Responders.

Code	Recommendation
1	It is essential to include "tech notes" and "memoranda" that ordinarily are not entered in existing data banks.
546	Great idea. Make sure it is well advertised.
107	Publicize widely after establishment
183	Definition of future threats is much needed.
332	Susceptibility (at least) could be in several specializing centers. The big job of a center is reformatting; not clear that one (single) facility is needed (for all S/V information).
396	Data must be verified, updated and traceable.
569	Such a repository of hardness/survivability information should include: 1. Hardness design information 2. Hardness criteria for relevant systems 3. Hardness test results - Summary reports - Test data 4. Relevant threat information 5. Survivability assessment data 6. Survivability assessment summary reports 7. Any other design or test information that relates to hardness or survivability. Semiconductor Device Radiation Response Data - Upset threshold - High level burnout - Neutron degradation

TABLE A-10.3. Volunteered Recommendations by Industry Responders.

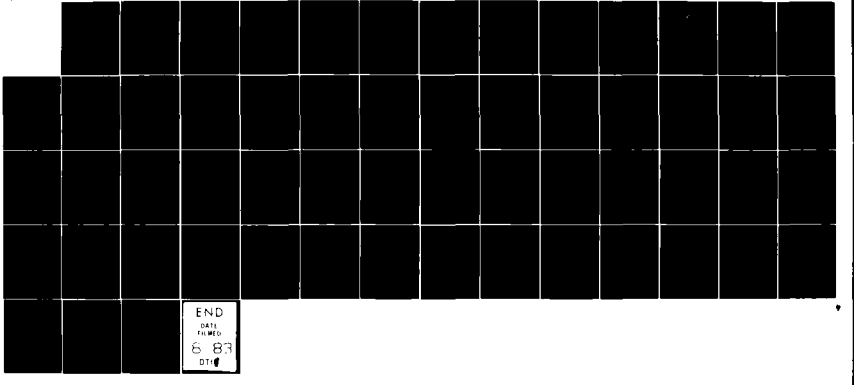
Code	Recommendation
823	Any interest in a professional S/V Association?
237	Need dissemination of (new) capabilities; (need) improvements in communication (to S/V community).
23	Check NMIAC (now obsolete).
25	Need ties with NTIS and Lockheed (DIALOG).
33	Central S/V facility should be run by Government.
236	Must include as many Naval activities as possible (ships, submarines, etc.).
238	Need more emphasis on signatures.
475	Countermeasures technology is general; specifics vary at the moment.
455	Up-to-date vulnerability and description data with tri-Service blessing is most needed.
434	Would like to cross over between weapon effects plus survivability—from representative to specific.
262	S/V expertise will be required to support full service analysis.
277	You will have to know the field technically.
454	You should extend your survey beyond the "technical community" to include ship operators.

TABLE A-10.4. Representative Questions/Comments From Government Responders.

Code	On SURVIAC Scope
535	Bibliographical data and library services are most important.
394	Test data gathering, cataloging, analysis and consulting assistance.
131	Interested in data on U.S. weapons, foreign targets, U.S. materiel vulnerability, etc.
356	Is information current? Is its source reliable?
563	Would local computer terminals have access to data base? On-line access desired.
337	Limited access data control will be a major SURVIAC problem.
584	We get queried on S/V and don't have manpower to organize or analyze the data we have. Also we sometimes need to collect all data on a specific helicopter.
585	Give me a spread-out of all data pertinent to a subject I pick: i.e., particle beam effects (sources, report numbers, abstracts, etc.).
163	Great pay-off in this idea to being contractors up to speed in S/V. Contractors need methodology. Will need monthly fliers to users according to their interests.
396	Will need secure terminal and hard copy capability.
569	What do individual groups and agencies have to contribute and what would they agree to release to such a repository? (Could we really get access to useful information?)
724	Who should be involved in S/V Center? Regular meetings?
	On General S/V
120	Vulnerability of vehicles to A.P. ammunition? Vulnerability of aircraft to HE ammunition.
102	Fragment sizes and velocities?
110	Main interest is ammunition fires.
174	Vulnerability information on specific threats versus specific target materiel, with known parameters.
311	What information is available on foreign surface target ships, gun ammunition?
560	Effectiveness of dual hard steel versus 9 mm.?
721	Primary interest in threat data versus advanced systems.
599	Optimal flight envelopes for tactical reconnaissance aircraft?
186	Method for evaluation/assessing fuel system design with respect to hydrodynamic ram damage?
154	Bibliographical listing of current technical reports describing experimental setups, results, analyses, comments. OK for nonnuclear kill (NNK) mechanisms such as particles, rods, etc.?
154	Latest reports on threat vulnerability and damage modes, NNK warhead development, NNK Concepts, etc.?

AD-A130 414 PROPOSAL AND JUSTIFICATION FOR THE ESTABLISHMENT OF AN AERONAUTICAL SYSTE..(U) ARMAMENT SYSTEMS INC ANAHEIM CA R BERNIER ET AL. OCT 82 JTCG/AS-82-SM-006 2/2

UNCLASSIFIED N00123-80-D-0033 F/G 5/2 NL



END
DATE FILMED
6 83
DTIC

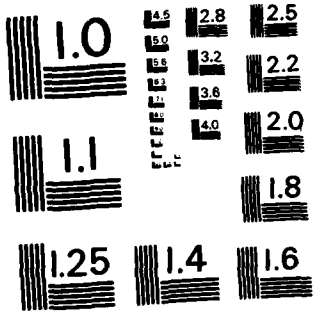


TABLE A-10.4. Representative Questions/Comments From Government Responders (Contd.).

Code	On Aerial Targets
586	What data (combat) is available on airframe vulnerability in actual combat environments? What type of design (airframe) was less vulnerable? Which aircraft are most vulnerable and why?
586	What data are available on battle damage repair requirements and approaches?
591	Provide detailed structural information on the aircraft to be used for analyzing the blast hardness of the aircraft.
591	Describe the flight characteristics of the aircraft after fuselage and flight surfaces have been damaged.
308	S/V versus Warsaw Pact threat including triple A missiles and attack helicopters, i.e., the HIND.
596	What or where are the engineering drawings for a given aircraft? What is their availability?
397	Need target vulnerable area and blast data for targets, such as F-15, SR-71, B-52, B-1B, Cruise missile and A-10, also missile vulnerability data on HARPOON.
173	What is vulnerability of helicopters to 105 mm APERS round?
324	Vulnerability of missile in foreign silos of C^3I centers?
336	Survivability of HARPOON, TOMAHAWK to Soviet ADM G-630.
362	Single versus dual engine aircraft? BVR versus WVR?
177	Weapons vulnerability analyses of USA aircraft?
701	Pk/h of C-5, C-141, C-130 for various weapons? Vulernable areas for aircraft and missiles?
	On Ground Targets
133	Deleterious effects on industrial plants and equipment?
115	Area of interest is field fortifications to protect weapon stores, C^3, vehicles, aircraft.
364	S/V of ground troops in fortified bunkers versus Navy gun fire in support of amphibious assault?
592	S/V data for late model and projected Soviet armor?
	On Ship Targets
335	Vulneraility of ships to missiles?
454	What has been trend since WWII, in the increased probability that a ship will not lose electrical power and communications for a given size shock factor? What has been the trend in time required to regain lost services during the same time frame?

TABLE A-10.4. Representative Questions/Comments From Government Responders (Contd.).

Code	
	On Ship Targets
4	What is current threat data for given class of ships?
191	Area of interest is Navy carrier decks. Technology transfer is only item of interest.
549	What does NAVSEA PM need in managing S/V of ship project?
196	Also vulnerability of ship equipment to airblast; ship super-structure?
360	Vulnerability of ships for hits by cruise missiles?
521	S/V analysis of aircraft ship missile systems, current and planned?
	On Space Targets
378	Aircraft space stations, missiles, ground communication station?
154	Current ICBM, SLBM, reentry vehicle descriptions and design information?
	On Nuclear Threat
573	Constitutive models for reinforced concrete and soils under high loading rates and high stress levels?
554	S/V of airbreathing "penetrators" and their potential attackers in nuclear war scenarios?
596	What are the hardness levels for a given list of aircraft?
596	What are the bases for determining these hardness levels?
596	What are airblast vulnerability overpressure reflection factors for a given aircraft?
540	What is information on cost effectiveness of overpressure protection of combat vehicles versus reliance on enhanced protections of individual crew members?
716	Levels of radiant energy withstood by different aircraft? Cockpit levels of damage? Threat evaluation?
	On Directed Energy Threat
130	Would like to see reports of directed energy effects on materials and structures.
344	Laser hardness of material as function of wavelength, pulsewidth time of radiation, etc.
354	Direct energy, especially lasers, critical need for data collection and distribution.
386	What is the vulnerability of helicopter canopies, wind screens to pulsed CO_2 radiation?
591	What are the cockpit materials in the aircraft? How will these materials react to 20–30 calories per square cm of thermal energy?

TABLE A-10.4. Representative Questions/Comments From Government Responders (Contd.).

Code	On Directed Engergy Threat
583	What systems/components of the aircraft are vulnerable to laser radiation?
583	What radiation fluence levels damage the aircraft system/components to various degrees?
583	What is the result/effect of each level of damage; e.g., is the mission aborted?
	Is the probability of target detection degraded 50%, 75%?
	On Chemical/Biological Threat
175	At this time, data are being gathered and compiled on the effects of chemical agents and decontamination materials on a spectrum of materials which have potential uses in military equipment. A data center which generated or compiled data of this kind would be useful in this task.
	On Detectabilities
192	What is the radar cross-section of the AH-1G Helicopter at 10 GHz?
536	Factor of safety used to establish IR-output requirements for decoy flares?
186	Data relative to effects of radar cross section (RCS) on radar directed guns, firing errors, detection probabilities versus target in clutter environment?
558	Relative spectral response and absolute sensitivty of both friendly and unfriendly missiles? What built-in mechanisms do missiles have to countermeasure decoys, if any?
558	Typical spectral distributions of typical targets of radiation seeking missiles (friendly and unfriendly)?
599	Availabiltiy of IR data for a given engine or aircraft.
717	Type of seekers used on SAM?
369	Effects of finish changes on RCS? Effects of vehicles trajectory on attrition and target vulnerability? Navy and Air Force Cruise Missile design/employments on electronic warfare?
596	Parametric data on electronic systems?
1	What is new in way of EMP protection?
191	Electromagnetic environmental effects (E_3), Air Force and Army do not operate in same E_3.
111	What are survivability of E-E circuits and C_3 systems?
509	What is threat to TAC-C_3 centers in USAF?

TABLE A-10.4. Representative Questions/Comments From Government Responders (Contd.).

Code	On S/V Methodology
389	Attrition information with one-on-one or force-on-force?
186	Methodology for assessing of RCS versus gun and missile threats?
186	Would like to know of models useful for assessing benefits, ROI, LCC, etc. for S/V enhancements items.
154	Impact experimental data results and numerical analyses applicable to ballistic missile defense nonnuclear engagements?
591	What are the battlefield scenarios of the aircraft?
	Other
562	What is R&D of foreign aircraft and weapon systems?
24	What are the crew functions? What are the system characteristics?
5	Describe the man-machine interface of the threat system.
555	Information on threat operator performance and procedures in realistic scenarios?
513	What are man-machine interfaces and threat crew procedures?
732	Space systems threats, countermeasures, vulnerabilities?
	Space system survey?

QUESTION 16: COMMENTS (e.g. typical question(s) you might ask of an S/V information center; S/V area of current greatest interest to you; use additional sheets if necessary).

N.B. – No questions/comments from 69%.

TABLE A-10.5. Representative Questions/Comments by Industry Responders.

Code	On SURVIAC Scope
260	Red tape for approval of fee may limit responsiveness.
282	Bibliographies, handbooks, or data?
402	Weapon survivability–is a high interest item.
809	Will require access to various levels of classification.
476	SURVIAC useful–what about security?
801	How should classified data be handled?
804	Handbook format is needed.
493	SURVIAC Mission Statement should include nuclear S/V.
460	Recommend it be an augmentation of DTIC
460	A concern is that a central DoD organization would not be responsive to individual service needs.
460	Contractors should be able to access the data bank by computer via telephone.
267	Most desirable information might be highly classified–tough to convince of the need-to-know.
33	SURIVAC should be operated by a Government in-house group.
33	Need-to-know and access to (qualified) contractors whether or not they have an existing contract?
33	Care must be exercised in operation and use of an IAC, that it does not contribute to too much standardization of methodologies and data, to the extent that it represents an "appeal to authority", regardless of appropriateness to the specific questions at hand–and that self-generated tailored S/V analysis is somehow considered suspect if it is not in the SURVIAC system.
25	Should the S/V Center make a computerized data base available to NTIS, DIALOG or similar service?
24	Generally the IACs are focused in a particular technology. Several have adequate overall approaches, i.e., GACIAC.
809	My interest is to be able to access the center for specific information applicable to advanced concepts; access is more important than detail.
845	How much classified information can be handled?
813	It is important to include domestic S/V as well as foreign S/V.
690	Identify specific target/weapon combination $P_{P/H}$; references for supporting data; associated authors, sources of documentation.
655	Concern that SURVIAC would have adverse effect on the JTCG/AFWAL aircraft S/V model repository.
610	Topical reference listings (aligned with question 10)
	On General S/V
608	Armor penetration technology?
451	Materials engineering–applications–alternatives?
623	Value levels for specific system components to stated threats.

TABLE A-10.5 Representative Questions/Comments by Industry Responders (Contd.).

Code	On General S/V
688	Threshold values of kill and associated failure mechanisms plus uncertainties of data?
693	Fuel systems–especially tanks?
206	Need information on mission related environments, nuclear, nonnuclear, thermal, etc.
297	Physical-thermal requirements to survive in nuclear and nonnuclear environment?
658	For all types of targets what is P_K versus warhead type, yield, fragments and what miss-distance is required to achieve various levels of kill?
658	Threat characteristics? Best way to counter threat?
658	Weapon requirements of S/V considerations?
648	U.S. weapons characteristics, particularly small caliber rounds?
606	What are the latest directions and developments in light-weight armor?
416	What, if any, trends exist concerning threats and vulnerabilities?
403	Data are needed on "soft" commerical targets–active and passive.
25	Effects of temperature, weathering, aging on ballistic properties of acrylics and polycarbonates?
852	Data on composities (missile) versus rods with 1/d greater than 4.
	On Aerial Targets
293	Current threat for AC-130 gunship armor?
218	How does probability of MMS/Q vary with miss-distance against the F-15?
458	Which Warsaw Pact aircraft carry 3000 kg bomb?
648	FMEA/DMEA for U.S. and foreign areial targets?
645	Our company focuses on gas turbine propulsion engines for light strike aircraft, trainers, RPVs tactical and strategic Cruise missiles.
834	What are the characteristics of the SM-2?
825	What are the survival envelopes for aircraft with XXX characteristics against SA-XX threat?
23	What test reports in 23 mm HEI versus fuel tanks with JP-4, JP-5 or JP-8 fuel? Can a shot-by-shot listing be provided? Combat damage from 23 mm HEI versus fuel tanks?
861	Information on hazards to external fuel tanks.
23	What has been the in-service experience with reticulated polyurethane foam inside or adjacent to fuel tanks of Air Force and Navy aircraft.
	On Ground Targets
447	Need vulnerability data on tank interior, air-defense systems, vehicles to establish P_{Ks}.
251	Equipment vulnerability to munitions?

TABLE A-10.5. Representative Questions/Comments by Industry Responders (Contd.).

Code	On Ground Targets
437	Vulnerability data and methodology versus foreign SAM sites?
458	What is effectivenss of rock rubble as bunker slab?
681	S/V information on other weapon systems, e.g., artillery.
277	What is the comparative response of laminate armor to shaped charge jet penetration?
277	What is the probability of an M-1 crewman surviving, if the ammunition bustle compartment is penetrated by a shaped charge jet?
	On Ship Targets
209	S/V models for surface ships against air, surface and sub-surface threats?
299	HE damage effects and damage control of Navy ships?
410	Ship nuclear-biological-chemical (NBC) defense?
424	S/V vehicle and ship requirements, available SPECS, hardware, on-going programs?
460	Typical area of interest is fire propagation within a ship.
410	Ship CPS, NBC Warfare Defense. Stability?
	On Space Targets
680	Space sytem S/V–systems engineering for survivability?
	On Nuclear Threat
495	Hardness of latest aircraft, ships, submarines, to blast (overpressure) dynamic pressure and peak translational velocity?
606	What are effects of nuclear radiation on solid state devices (e.g., TREE)?
416	Threat nuclear effects to fuzes and safe-arm devices as used on projectiles and guided missiles?
416	Anticipated effects on metals, plastics, explosives, electronic components (chips) transparencies? Relative vulnerability rankings of alternatives? Distinguish among prompt, delayed, short-term and long-term effects.
857	Data on exposure of electrical/electronics hardware to radiation.
	On Directed Energy Threats
495	Hardness of vulnerable parts of HEL weapon systems?
656	Laser effect data, structural response data; models?
825	What are the physiological thresholds for e-beam radiation?

TABLE A-10.5. Representative Questions/Comments by Industry Responders (Contd.).

Code	On Directed Energy Threats
840	Component susceptibility (vulnerability) to continuous wave (CW) and repetitively pulsed (RP) directed energy weapon effects for range of wavelengths, beam size and shape, intensity profiles beam quality, and jitter.
840	Material responses to directed energy weapon effects for range of parameters in comment A.
840	Vulnerability of direct energy weapon systems to hostile nuclear and non-nuclear weapon effects.
840	Candidate countermeasures to negate directed energy weapons and their effects.
840	Standardization beam propagation codes for endoatmoshperic and exoatmoshperic applications including battlefield environments (smoke, dust, aerosols, etc.)
840	Directed energy weapon effects on air vehicle transparencies and reradiated effects on bio-optical targets.
840	Results of directed energy tests on target materials/components/systems.
840	Compilation of directed energy weapon applications studies.
859	Sensors and component S/V to Directed Energy.
	On Chemical/Biological Threats
667	Data on materials compatible with biochemical agents?
202	Crew survival, performance in contaminated environments–vehicle response to decontamination?
825	What is the persistence of CBR substance XXX given air-drop delivery?
	On Electronic S/V
412	Failure thresholds (permanent damage or upset) of components and subsystems for EMP versus missiles, radars and launch equipment?
606	What is the state-of-the-art in EMP devices for shipboard and airborne application? What recent technology to protect new electronic equipment from shock and vibration?
460	Would like data on vulnerability of land/space C^3I installations.
206	A specific interest area is Equipment Space Thermal Data and EMP information on fields after nuclear detonation.
842	Questions regarding susceptibility of electronic components to specific nuclear/nonnuclear threats.

TABLE A-10.5. Representative Questions/Comments by Industry Responders (Contd.).

Code	On Methodology
438	Conversion of 1 on 1 data to force attrition estimates?
659	Approaches to existing S/V analysis; rationale for adapting these approaches?
239	How are FLIR devices currently modeled?
245	Measures of maintainability and reliability?
648	Battle damage repair methodology.
825	What is the survival probability (and the physical factors influencing the numbers) for air-to-air engagement of x-aircraft using x-missile against y-aircraft?
818	Operational analysis of tactical munitions versus various weapons targets?
23	Guidance for assigning $P_{K/Hs}$ to aircraft fuel tanks with JP-4 hit by 23 mm HEI shell with delay fuze (MG-25)?
655	Few methodologies are suitable for preliminary design of out-year sytems. Subsystems and total system description information is hard to acquire.
655	Data sufficient for PACAM or SAMS (TACZINGER) models? Data on threat weapon systems? Details of countermeasure sytems?
842	Comparative cost data concerning designs/techniques available to assure survivability?
862	Technical and operational parameters for threat missile seekers and fuzes?

QUESTION 16: COMMENTS (e.g. typical question(s) you might ask of an S/V information center; S/V area of current greatest interest to you; use additional sheets if necessary).

DEPARTMENT OF THE ARMY
HEADQUARTERS UNITED STATES ARMY
MATERIEL DEVELOPMENT AND READINESS COMMAND
5001 EISENHOWER AVE., ALEXANDRIA, VA 22333

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE LOGISTICS COMMAND
WRIGHT-PATTERSON AFB, OHIO 45433

DEPARTMENT OF THE NAVY
HEADQUARTERS NAVAL MATERIAL COMMAND
WASHINGTON, DC 20360

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE SYSTEMS COMMAND
ANDREWS AFB, WASHINGTON, DC 20334

JOINT DARCOM/NMC/AFLC/AFSC COMMANDERS
JOINT TECHNICAL COORDINATING GROUP ON AIRCRAFT SURVIVABILITY
NAVAL AIR SYSTEMS COMMAND
DEPARTMENT OF THE NAVY
WASHINGTON, D.C. 20361

Refer to:
5164:DBA
30 Apr 1982

From: Chairman, Joint Technical Coordinating Group on Aircraft Survivability (JTCG/AS)
To: Distribution

Subj: Survey of Need for a Survivability/Vulnerability Information and Analysis Center (SURVIAC)

Encl: (1) Proposed SURVIAC Mission Statement
(2) Questionnaire

1. Survivability/vulnerability information is a crucial element in the design and production of most military equipment. Yet, timely accessability to the available information remains a problem to potential users within the DoD and industry. To improve this situation, the Joint Technical Coordinating Group on Aircraft Survivability (JTCG/AS) and the Joint Technical Coordinating Group on Munitions effectiveness (JTCG/ME) are studying the utility of the Information and Analysis Center (IAC) approach which has proven successful in numerous other technical disciplines.

2. A survey of the technical community, to identify users and to determine if an IAC would provide a major improvement in nonnuclear survivability/vulnerability information accessability/utility, is required. If an IAC is desired by the technical community the peculiar requirements of a "SURVIAC" must be defined. A simple questionnaire is enclosed to facilitate your response and to assist us in preparing justification for a SURVIAC. Additional comments outside the scope of the questionnaire are welcome.

Dale B. Atkinson

Dale B. Atkinson
Chairman, JTCG/AS

Proposed Mission Statement
for a
Survivability/Vulnerability Information
and Analysis Center
(SURVIAC)

SURVIAC's mission is to perform the functions of a full service Department of Defense (DoD) Information and Analysis Center (IAC) as described in DoD Instruction 5100.45, "Centers for Analysis of Scientific and Technical Information". It will provide scientific and technical information and support activities to organizations within DoD and to their contractors. SURVIAC's principal field of interest will be the vital technical area of nonnuclear survivability/vulnerability as it relates to US/Foreign aircraft and missile systems.

SURVIAC's data bases will consist of those identifiable existing data bases of the nonnuclear survivability/vulnerability community and those under development. It will be able to refer to constantly updated computerized bibliographical information on various relevant documents. It will update, review, and expand to incorporate current relevent research results. It will analyse, appraise, and summarize information and disseminate such through bulletins, directories, bibliographies, and reports.

SURVIAC will also serve as a repository and ultimately perform configuration management control for survivability methodologies.

SURVIAC will provide a single focal point within DoD for nonnuclear survivability/vulnerability information.

QUESTIONNAIRE ON ESTABLISHING A SURVIVABILITY/ VULNERABILITY (S/V) INFORMATION ANALYSIS CENTER

1. Does a need exist for a central clearing-house for information on S/V data, analysis, and technology? Yes No

2. Should such a central facility be chartered as a DoD S/V Information Analysis Center? Yes No

3. (a) Would you characterize yourself (or your organization) primarily as a ____ generator, ____ user, ____ neither of S/V information?

   (b) Would you use a central source of S/V information if it was available to you? Yes No

4. What types of targets are you interested in?

AERIAL	U.S.	Foreign	NATO
____ Fixed Wing	____	____	____
____ Rotary Wing	____	____	____
____ Missiles	____	____	____
____ Other ____	____	____	____
SURFACE			
____ Vehicles	____	____	____
____ Facilities	____	____	____
____ Structures	____	____	____
____ Ships	____	____	____
____ Space	____	____	____
____ Other ____	____	____	____

5. What types of threats are you interested in?

____ Non-Nuclear	____ Natural–Environmental
____ Directed Energy	____ Crash/Post Crash
____ Chemical/Biological	____ Other _____
____ Nuclear	

6. What are your current major sources of S/V information among those listed below?

____ DoD Documents (DTIC)	____ Industry Publications
____ Army	____ Handbooks/Data Books
____ Navy	____ Conference Papers
____ Air Force	____ Seminars/Workshops
____ JTCG/ME	____ Newsletters/Bulletins
____ JTCG/AS	____ Others _____
____ CDIC	

7. What data bases, information centers, and/or sources of data (other than the Defense Technical Information Center and National Technical Information Service) do you currently deal with to obtain S/V data? Include U.S. and foreign scientific and technical society published and unpublished minutes, papers and proceedings.

8. (a) Which of the following existing Information Analysis Centers have you used (or are very familiar with)?

____ IRIAC	____ PLASTEC
____ DASIAC	____ SVIC
____ TEPIAC	____ RAC
____ CPIA	____ CEIAC
____ GACIAC	____ CRSTIAC
____ DACS	____ CTIAC
____ MCIC	____ HEIAC
____ MMCIAC	____ PSTIAC

8. (a) Continued

_____ MPDC _____ SMIAC

_____ NTIAC _____ TACTEC

_____ Other _____

_____ None of the above

(b) Do you consider the approaches of any of these centers appropriate/adaptable to S/V Information? Yes No

Comment:

9. Which of the following problems do you regularly encounter with respect to S/V Information?

_____ Unaware of available technical/analytical information and methodologies

_____ Needed information unavailable/non-existent/difficult to locate

_____ Inconvenient/incomplete form of information

_____ Poor quality (unreliable, dated etc.) information

_____ Information not oriented/slanted to my needs

_____ Other _____

10. Which of the following products/services would best satisfy your S/V information needs (rate each item chosen from 1 (the most important) to 4 (the least important))? Choose as many as applicable.

_____ State-of-the-Art Reviews _____ Quick Response to Technical Inquiries

_____ Current Awareness Newsletter _____ Conferences/Symposia

_____ Current Awareness Bibliographies _____ Application Workshops

_____ Handbooks/Data Books _____ Standards/Practices

_____ Technology Briefs/Notes _____ Training Materials

_____ Technical Journal _____ Current Projects Status

_____ Consultants Directory/Referral _____ Other _____

11. Which of the following elements of S/V would best describe your interests and needs?

_____ Threat Data

_____ Test Data/Results

_____ Vulnerability Assessment

- _____ Failure/Damage Modes
- _____ $P_{K/H}$ Functions
- _____ Combat/Field Data
- _____ Vulnerability Indices
- _____ Battle Damage Repair

_____ Vehicle Design

_____ Susceptibility Assessment

- _____ Detectable Signatures
- _____ Threat Detection
- _____ Countermeasures

_____ One-on-One Engagement

_____ Vehicle Design

_____ Model/Methodology

- _____ Target Descriptions
- _____ Vulnerability
- _____ Lethality
- _____ Susceptibility
- _____ End game
- _____ Trade Offs (opportunity cost analysis)
- _____ Mission Effectiveness
- _____ Attrition

_____ Mission Scenarios (force on force - campaign analysis)

_____ Other _____

12. Desirable form of S/V information (rate items chosen from 1 (the most important) to 4 (the least important))? Rate all items.

    ____ Topical data sources only

    ____ Raw data identification only

    ____ Data with comments

    ____ Flexibility in data formats

    ____ Data with analysis

    ____ Other _____

13. Which of the following areas would best describe your regular work activities or emphasis relevant to S/V technology?

    ____ Research and Development

    ____ Design

    ____ Management

    ____ Test

    ____ Analysis

    ____ Other _____

14. Which of the following disciplines would best describe your educational background?

    ____ Mechanical Engineering

    ____ Electrical Engineering

    ____ Civil Engineering

    ____ Mathematics

    ____ Physics

    ____ Chemistry

    ____ Ballistics

    ____ Physical Science

    ____ Management

    ____ Computer Science

    ____ Safety Science

    ____ Information/Library Science

    ____ Other _____

15. Establishment of a SURVIAC under the auspices of DoD with the mission scope previously described will require asessment of nominal fees for selected services to industry. Would this limit the use of the SURVIAC?

Yes No

16. COMMENTS (e.g., typical question(s) you might ask of an S/V information center; S/V area of current/greatest interest to you; use additional sheets if necessary).

Name, Address, Phone _____

_____

_____

_____

Please contact me for further discussion. Yes No

Return this questionnaire within 30 days to:

Chairman JTCG/AS
Naval Air Systems Command AIR-5164

Appendix B

SUMMARY OF FACT-FINDING VISITS TO SELECTED INFORMATION ANALYSIS CENTERS (IACS) IN ORDER TO IDENTIFY SCOPE AND OPERATION OF A PROPOSED SURVIVABILITY (S/V) INFORMATION ANALYSIS CENTER–SURVIAC

APPENDIX B CONTENTS

B-1.0 BACKGROUND

The military R&D community recognizes that Survivability/Vulnerability (S/V) information is a critical input for the design and evaluation of effective equipment. A vast amount of relevant data exists, but unfortunately the information is not centralized nor readily available to the large number and variety of users that need it, when they need it.

Currently, the Joint Technical Coordinating Group on Aircraft Survivability (JTCG/AS) and the Joint Technical Coordinating Group for Munitions Effectiveness (JTCG/ME) are jointly investigating means to remedy the chronic crisis in timely dissemination of S/V information. This problem is not unique to S/V technology; in fact, it is quite common to many emerging technologies with "exploding" data bases. The Department of Defense has sponsored a number of Information Analysis Centers (IAC) which have been responsive in a number of specialized technical information areas. While none of them are intended primarily to respond to the needs of the S/V community, some do provide relevant critical information in key sub-areas of S/V. All centers differ in technical scope; and their goals and modes of operation vary accordingly to meet the respective needs of their military and/or industry communities. Nevertheless, they all have the common goal of centralizing and disseminating specialized technical information which is responsive and timely. The same general approach and experience seems most pertinent to the current information problem in S/V.

Part of the JTCG investigations for planning a proposed SURVIAC was the survey of the S/V information users. Appendix A details the specific and urgent needs, preferences, etc. as expressed by the users in the recent Survey conducted to define the problem. This Appendix B addresses the approaches and experience on many existing IACs in accomplishing similar missions.

Sixteeen centers were visited to interview their directors and to assess the facilities required to provide various "products/services". Commonalities with S/V were identified, with special emphasis on those factors which might apply to defining, planning, starting-up and operating a responsive SURVIAC.

B-2.0 OBJECTIVES

The general objective of this investigation is to define the scope and document the requirements of a center for S/V data, analysis and technology, i.e., the proposed SURVIAC. The objective of this Appendix is to identify and document those specific factors of approach, organization, operation and experience of the existing IACs which are directly pertinent to the planning, organization and development of the proposed SURVIAC.

One goal (of Appendix B) is to define the technical interface of the S/V discipline with technologies of the existing IACs. To minmize duplication, it is necessary to identify

the existing IAC services/products which are already available, and which respond sufficiently to some of the information needs of S/V users. For such information, close coordination is required between SURVIAC and the other relevant IACs.

SURVIAC is proposed specifically to serve S/V users. While the subject matter differs among all the IACs, their common mission is the dissemination of specialized technical information. Hence, SURVIAC should take advantage of the previous experience of the IACs to determine size, required facilities, staffing, budget and other factors, which determine the required resources to set-up, start-up and develop a responsive center. A specific goal of the IAC visits was to identify those factors which are relevant (or irrelevant) to S/V information, to the intended users and to any other SURVIAC unique requirements.

A related goal (of Appendix B) is to provide as much factual data as possible to guide the planning and justification of the proposed SURVIAC.

B-3.0 INFORMATION ANALYSIS CENTERS (IAC) GENERAL DESCRIPTION

Some of the IACs are relatively new, while others have been serving their communities for decades. Yet, the recent Survey (Appendix A) revealed that 68% of the S/V user community were not familiar with even one of the IACs. Figure B-1 (obtained from MCIC at the Battelle Columbus Laboratories) schematically illustrates some basic functions of most of the information centers. The following brief description was extracted from the DTIC/DLA pamphlet "Information Analysis Centers Profiles for Specialized Technical Information":

"INTRODUCTION

In the Defense Department, nine contractor-operated IACs are now administratively managed and funded by the Defense Logistics Agency (DLA) and the Defense Technical Information Center (DTIC), a primary level filed activity of DLA, and 10 others are managed by the other DoD activities. The establishment of a contractor operated Manufacturing Technology Information Analysis Center (MTIAC) to be administered by DTIC is anticipated. These Centers receive technical management from DoD laboratories and agencies with leading competence in the field of science and technology within which the particular centers field of interest. In addition, technical expertise is provided by practicing scientists and engineers associated with the research and development facility.

IAC MISSIONS

IACs are basically similar in operation, but dissimilar in subject matter. Each Center collects, reviews, analyzes, appraises, summarizes, and stores available information on subjects of highly specialized technical areas of concern. The collections, which

are computerized, are expanded on a continuing basis to incorporate the most current international research information.

The synthesized information in selected subject areas is then repackaged and disseminated according to expressed or anticipated needs.

An additional mission relates to technical and administrative support to joint DoD committees to: review and coordinate R&D efforts concerning interservice compatibility of technology programs, and promote the exchange of technical information in specialized subject areas.

USERS

The following communities have access to IAC research information:

U.S. Government Of Defense and other Government Organizations
U.S. Government contractors and grantees.

Private sector to the extent practicable without impairment of services to DoD and consistent with security and other limitations on release of such data.

PRODUCTS/SERVICES

The Centers generally offer the following categories of products/services:

Abstracts and Indexes - Announcements in the form of abstracts and indexes of pertinent reports in the IAC's field of interest.

Technical Inquiry Services - Authoritative advice in response to technical questions posed by the user.

Bibliographic Inquiry Service - References to the latest and most relevant authoritative reports covering user's inquiry.

Scientific and Engineering Reference Works - Useful and authoritative information applicable to on-going work through design, preparation and maintenance of handbooks and data books.

State-of-the-Art Reports - Summaries of the status of technologies that are pertinent to current research, development, test and evaluation (RDT&E) decision-making with usefulness extending from the bench level to all levels of RDT&E management.

Critical Reviews and Technology Assessments - The latest scientific or engineering information in the most useful format on subjects of significant interest to the Defense RDT&E community. Those reviews and assessments may provide comparative analyses of technologies based on technical, national and/or geographic considerations.

Current Awareness - Newsletter and reviews to keep the Centers' users appraised of the latest and most significant technological development within the Center's field of interest.

Special Studies/Tasks - Detailed problem solution information which is narrow in scope.

Technical Conference/Interagency Committee Organization and Administration - Administrative and technical support to technical conferences and joint committees in the Department of Defense. The purpose of these committees is to solve problems, effect coordination of technology programs, and promote an exchange of technical information.

COST

To offset costs incurred in preparing materials or responses, service charges are imposed on products and services. Such costs are established according to individual income objectives.

There are several payment options, for example: subscription plans, deposit accounts with the National Technical Information Service; blanket purchase agreements; and Military Interdepartmental Purchase Requests. However, it is suggested that the individual Center be contacted for information applicable to payment plan.

SOURCE MATERIALS

Information sources for IAC publications include technical reports from DoD, other Government agencies, industry and academic institutions; open literature, including foreign sources; unpublished papers; meetings; conference proceedings, and the like. In fact, continuing searches are conducted for appropriate information, and the Centers welcome suggestions concerning additional sources."

B-4.0 PROCEDURE

Initial background information on the IAC-network was obtained from the Defense Technical Information Center (DTIC) and the Defense Logisitics Agency (DLA)–including

their pamphlet on "Profiles". In particular, the following were visited: Mr. J. Pendergast, the DTIC program manager for nine IACs assigned to DTIC, his assistant Mr. Brian McCabe and Mr. E. D. Collins (DLA-STC). Additional guidance was provided including a previous "Planning Study to Establish DoD Manufacturing Technology Information Analysis Center" (which recently became MTIAC). With their approval, the Chairman of the JTCG AS requested the respective Directors of selected IACs to be interviewed by his representative(s) (see Figure B-2.). For their expertise in S/V, the following were selected to conduct the interviews and accumulate the relevant data presented herein: Messrs. Roland G. Bernier, James B. Foulk, R. A. (Tim) Horton and Donald W. Mowrer. With advanced notification, a letter of introduction and the required security clearances, sixteen centers were visited (by one, two or three of the above representatives), between 31 March and 12 May (as shown in Table B-1). Six of the centers were visited in a circuit through the Midwest; two others required a trip to California; and the remaining (eight) were visited separately.

In the recent Survey (Appendix A), the need for "Data with Analysis" was clearly identified by a large majority of the S/V information users. Note that this critical function is not required from many of the existing IACs.

B-5.0 TECHNICAL RELEVANCE OF EXISTING IACs TO S/V INFORMATION

The responsibility for the dissemination of technical documents to DoD Government agencies and their contractors is vested in the Defense Technical Information Center (DTIC) and in the National Technical Information Service (NTIS) for unrestricted data. DTIC is intended to collect, reproduce and distribute all technical reports and other documents generated by DoD agencies, including S/V related information, to qualified users (with established need-to-know). Most Government agencies and their contractors, including S/V users, are aware of and utilize this service. Unfortunately, it becomes difficult to find the available information on very specific problems in such a large data base. Hence, the need for the specialized information centers. For S/V information, this problem is further compounded by the broad nature and scope of the discipline, and the fact that not all S/V-relevant documents are entered in the DTIC system. Furthermore, the search key words of the DTIC system do not adequately discriminate S/V topics; hence, the need for a specialized center dedicated to S/V information. However, in spite of this deficiency, some of the existing centers already provide information which is directly or indirectly related to some significant S/V related technical areas. The interviews attempted to clarify these technical interfaces and the extent of their support to S/V. At least six of the existing centers directly overlap into S/V technology: CDIC, DASIAC, GACIAC IRIA, ASIAC and TACTEC, in additon to the AFWAL/JTCG Aircraft Survivability Model Repository at the Battelle Columbus Laboratories, which was created by the JTCG/AS specifically to support S/V users.

B-5.1 CDIC

The Combat Data Information Center was created in 1970 and continues to be supported by the JTCG/AS and JTCG/ME, specifically as a focal point for "real-life" data in support of S/V evaluations. This center is located at the Wright-Patterson Air Force Base; its operation by Booz-Allen and Hamilton, Inc. is monitored by the Flight Dynamics Laboratory of the Air Force Wright Aeronautical Laboratories (AFWAL/FIES). Currently it is not formally a part of the DTIC/IAC network, but of all the existing information centers, its mission comes closest to that of the proposed SURVIAC. Its the most logical nucleus from which to build a full-service SURVIAC. Its initial and primary function is to centralize the collection and dissemination of combat related operational data. Collections include damage reports from Southeast Asia and the Middle East, on fixed wing, rotary wing and ground vehicle targets. In addition, it includes a significant test data base on ballistic damage and high energy laser (HEL) tests and a library specifically dedicated to documents in direct or indirect support of S/V analysis and evaluation. The test data bases were developed independently, including some from NMIAC (since discontinued), and they are available for "selective" retrieval. CDIC represents the largest single source of nonnuclear S/V "raw" data in the country. While it provides is known to the S/V community, it appears underutilized, probably because it is not a full-service SURVIAC. While it maintains the capability to technically screen and interpret combat data, it lacks analysis capability for other types of S/V information sufficient for the responsiveness essential to most users.

B-5.2 DASIAC

Traditionally, nuclear and nonnuclear effects data have been collected and disseminated separately. Nuclear effects are sufficiently different by nature to justify such separation, and in most cases they are used by different segments of the S/V community. Because the nuclear and nonnuclear damage both represent large homogenous data bases, different in nature for different users, it appears logical to maintain them separately. However, nuclear and nonnuclear survivability must be integrated into military equipment, and many users need a central focal point that coordinates the information on a common basis for proper balance of nuclear and nonnuclear requirments in specific applications. Such a central focal point for coordination of overall survivability information does not now exist within DoD. However, the Defense Atomic Support Agency Information Analysis Center (DASIAC) at Santa Barbara, California was established in 1961 to serve as DoD focal point for information and data on nuclear phenomenology and nuclear weapon effects on tactical and strategic military systems. Kaman Tempo operates the Center under contract to the Defense Nuclear Agency (DNA). While it is not formally affiliated with DTIC/DLA, it is tied into the IAC network. DASIAC is well-organized as a full-service information center in its defined technical sphere, although it is not clear that the degree of analysis and forms of output completely respond to the specific application needs of all the various S/V users. By the nature of its information, DASIAC utilization is necessarily restricted for national security reasons. Nevertheless, it is widely utilized by qualified users. In fact, the recent S/V user survey (Appendix A) indicates that: of all the IACs, DASIAC is the most familiar and most

utilized by the total S/V community. Its operation includes access to nonnuclear information through the DTIC/IAC network, but its mission does not include responsibility for dissemination of nonnuclear information. For numerous reasons, it does not appear necessary or desirable or even practical for complete integration or centralization of nuclear and nonnuclear S/V information. The need for a full-service nonnuclear center comparable to DASIAC is quite apparent, and the need for very close coordination between nuclear and nonnuclear S/V is equally overdue. Such coordination should include data transmission ties as much as security safeguards will permit, such that timely combined responses can be provided to the users whenever such a need arises.

B-5.3 IRIA

The S/V domain includes two distinct subdivisions: target detectability and target vulnerability (i.e., damage given a hit). Weapon sophistication continues to spawn a variety of specialized technologies for detection, guidance, acquisition, avoidance, countermeasures, counter-countermeasures, etc. by means of radar, infrared, laser, electro-optics and other means. A number of information centers have evolved in direct response to such exploitations of technology advances, two of which disseminate S/V-related information: i.e., IRIA and GACIAC. Both are directly affiliated with the DTIC/IAC network and partially supported by DLA. Neither is intended mainly to support S/V evaluations, nor do they disseminate test data or analysis in the ideal form for S/V users. However, both provide information which impacts the "detectability" considerations/evaluations of S/V.

The Infrared Information and Analysis (IRIA) Center was established at Ann Arbor, Michigan in 1954 by the Office of Naval Research (ONR), and since 1973 it has been operated by the not-for-profit Environmental Research Institute of Michigan (ERIM). Its mission is to collect, analyze and disseminate information on infrared and electro-optical technology, with emphasis on the military applications, and to assist ONR in the administration of the Infrared Information Symposia (IRIS) and the DoD Laser Conferences. The subject area covered by IRIA include: radiation sources emitting in the UV through IR regions; radiation characteristics of natural and man-made targets; optical properties of materials; detection materials and elements; masers and lasers; image tubes; optical systems and components; detector coolers; atmospheric absorption, emission and scattering; and search, homing, tracking, ranging countermeasures, reconnaissance, and other military infrared and laser systems. IRIA is well-recognized in its primary (IR) community, including the S/V users to a lesser degree.

B-5.4 GACIAC

One of the newer centers, the Tactical Weapon Guidance & Control Information Analysis Center (GACIAC) is five years old. It is operated by the Illinois Institute of Technology Research Institute (IITRI) in Chicago under contract with the Defense Electronics Supply Center and technically monitored by the U.S. Army Missile Command, for DLA. The center was chartered under DoD simultaneously with the Joint Service Guidance &

Control Committee (JSGCC). Both the Committee and the Center were created to promote and facilitate the exchange of technical information between the Military Services and Defense Agencies (and with industry), establish standards, and effect coordination of research, exploratory development, and advanced technology demonstration programs in the area of tactical weapon guidance and control. Its mission and scope include the technology and related analyses, hardware subsystems and systems. Tactical weapons of interest include missiles, rockets, bombs, submunitions, and projectiles having nonnuclear and (tactical) nuclear warheads. Technical areas of interest include instrument and seeker development test; subsystem and system simulation; development of computational techniques and hardware; theoretical performance calculations; inertial component and system devices; special design test equipment and techniques; component design criteria; analytic test techniques; manufacturing process development; operational serviceability; environmental protection and materials areas specifically related to weapon guidance and control. While the GACIAC mission does not explicitly cover S/V technology support, it is apparent that they centralize much of the complex data base that supports evaluation of detectability and "hittabilty" of air and ground targets by guided missiles and other weapons. Accordingly, it is recognized as a source of S/V information, as acknowledged in the recent user survey. Its apparent underutilization (for S/V) is probably due partly to its relative youth as a center, partly to the inherent security restrictions, and partly to the inconvenient form of its output for support of specific S/V evaluations.

For both IRIA and GACIAC, the potenial impact of their large complex data bases upon S/V evaluations is apparent. Hence the need for close ties and coordination with the proposed SURVIAC is critical, if it is to provide improved full service in a form that is responsive and suitable to the S/V needs of users.

B-5.5 ASIAC

The Aerospace Structures Information and Analysis Center (ASIAC) at Wright-Patterson Air Force Base, is operated by the Anamet Laboratories, Inc. for and at the Flight Dynamics Laboratory. While it is not part of the DTIC/IAC network and is not on line at DTIC, it has access to many large computerized data bases, including DTIC, NTIS, NASA, DIALOG, and others, in addition to its own extensive holdings in microfiche and hardcopy. The collected information covers metallic, non-metallic and composite structures, including macro and micro behavior. Among the other information disseminated, the Center also distributes computer programs and performs structural analyses and tests. While the ASIAC mission does not explicitly cover vulnerability of structures, or damage analysis, its potential impact upon the evaluation of damage by projectiles striking structures is apparent, especially for the newer composite materials for which very little empirical damage test data is available. As such, it is of interest to the aerial target segment of the S/V community, and hence a potentially significant source to be coordinated with the proposed full-service SURVIAC.

B-5.6 TACTEC

Whereas the other IACs are technology–or discipline–oriented, the Tactical Technology Center is mission-oriented. It is a DoD center supported by the Defense Advanced

Research Projects Agency (DARPA) and not by DTIC/DLA. It is an outgrowth of the Remote Area Conflict Information Center (RACIC), which was also operated by the Battelle Columbus Laboratories at Columbus, Ohio until 1971 when it became TACTEC. Subject coverage includes the technology of tactical warfare from incipient insurgency through tactical nuclear warfare. Tactical technology is assumed to include: surveillance, target acquisition and engagement; detection; guidance systems; position location; chemical warfare and decontamination; communications and electronics; countermeasures and counter-countermeasures to include disguises, decoys and aerosols; weapons and munitions; armor and protective devices; mobility and logistics; aircraft and air operations analysis; and training. It can be seen that nearly all the subject coverage is somewhat relevant to S/V and some directly overlaps, but S/V analysis or support is not explicitly identified. However, its extensive document holdings definitely require close coordination with a proposed full-service S/V center. At present TACTEC services are not utilized extensively by S/V data users, partly because it is not as well known as the other IACs, and partly because (like S/V) its scope is more difficult to define.

B-5.7 OTHER INFORMATION ANALYSIS CENTERS

The SURVIAC potential interfaces with the six of aforementioned centers (CDIC, DASIAC, IRIA, GACIAC, ASIAC and TACTEC) are clear, as well as the corresponding need for close coordination with their data bases. Indirectly all the other IACs are also relevant to S/V information or its support, but to a lesser degree. The relevance of the Nondestructive Testing Information Analysis Center (NTIAC) and the Shock and Vibration Information Center (SVIC), to the evaluation of destructive damage concerning S/V is fairly apparent, but the data output is not likely to be in a form readily suitable fro S/V users. The limited relevance of the Reliability Analysis Center (RAC) and the Data and Analysis Center for Software (DACS) lies only in the limited commonality between the reliability and survivability discipline which both deal with materiel failures. Also both centers deal with software and other components of the potential targets. The remaining six centers mainly cover special materials and/or special properties of materials: Metals and Ceramics Information Center (MCIC), Mechanical Properties Data Center (MPDC), Plastics Technical Evaluation Center (PLASTEC), Metal Matrix Composites Information Analysis Center (MMCIA), Thermophysical and Electronic Properties Information Analysis Center (TEPIAC) and Chemical Propulsion Information Agency (CPIA). To the extent that these materials and/or their properties can influence target damage evaluation, these Centers should eventually be coordinated with a full-service SURVIAC; however, the relevance of some of these data bases to S/V may be marginal.

B-5.8 TECHNICAL INTERFACE SUMMARY

By definition the IACs exist to disseminate highly specialized technical data. Each is different in technical scope, but they are all highly coordinated to serve DoD users. Similarly, the proposed SURVIAC should also be coordinated to benefit from all the relevant technical data bases. However, the relevance of the existing Centers to S/V technology and to the

support of its users varies from direct and major to indirect and marginal. In order of importance to SURVIAC: CDIC, DASIAC and TACTEC probably rank first, GACIAC, IRIA and ASIAC second, and then all other IACs. With the possible exceptions of CDIC and DASIAC, none of the existing IACs, or DTIC/NTIS, provide output in a form directly applicable to S/V evaluations by the users (as confirmed by the recent Survey). Hence, the technical scope of the proposed full-service SURVIAC should include:

1. Coordination with all existing IACs (and other information sources).

2. Close coordination with the most pertinent IACs.

3. Sufficient depth in S/V analytical capability to screen and interpret the applicability of information to the problems of users.

B-6.0 OPERATIONAL RELEVANCE OF THE EXISTING IACS TO THE PROPOSED SURVIAC

Except for CDIC and DASIAC, none of the existing Information Analysis Centers disseminate information strictly for S/V. Apparently the Centers are not widely known in the S/V community, but they are certainly experienced in collecting, organizing and disseminating specialized technical information. Of the sixteen IACs selected for visits, thirteen have been serving over 10 years, eight have been serving over 20 years and two are 35 years or older. These IACs were selected for interviews: partly for technical relevance to S/V, partly to cover a variety of operations, and partly for travel economy and other reasons. The general goal was to identify whatever might be pertinent to plan, define and justify the proposed SURVIAC.

B-6.1 SPONSORSHIP, AFFILIATIONS AND OPERATION

All of the (16) Centers are more-or-less tied into the DTIC/IAC network. As a minimum, each has search access to the automated unclassified holdings in DTIC via terminal. Nine of these IACS are directly affiliated with DTIC/DLA who provides DoD (partial) funding for "basic" support (see *Centers in Table B-2). The other (7) Centers are supported by: the three individual services, DARPA, DNA and the JTCGs for Aircraft Survivability and Munitions Effectiveness. All of the IACs are technically monitored and/or program-managed by appropriate Government DoD laboratories/agencies, with recognized expertise and responsibility in their subject technologies. Four are monitored by the Army Materials and Mechanics Research Center (AMMRC); two each by the USAF Flight Dynamics Laboratory (FDL) and the Rome Air Development Center (RADC); and one each by DARCOM, MICOM, ONR, NOL, NRL, NAVSEA, DARPA and DNA. All but two of these Centers are operated by qualified contractors, including six actually located on Government facilities (CDIC, ASIAC, SVIC, PLASTEC, RAC, and DACS). Only SVIC and PLASTEC are directly operated

by Government (civilian) personnel; SVIC contracts printing only; PLASTEC utilizes NTIS for distribution of its products. The IIT Research Institute operates three Centers (GACIAC on campus in Chicago, Illinois, RAC and DACS at the Rome Air Development Command, Griffiss AFB, New York). The Battelle Columbus Laboratories also operate three centers at Columbus, Ohio, i.e., TACTEC, MCIC and MPDC (now incorporated into MCIC); Kaman-Tempo (formerly GE TEMPO) operates DASIAC and MMCIAC at Santa Barbara, California; at the WPAFB, CDIC is operated by Booz-Allen and Hamilton, Inc., and ASIAC by Anamet Laboratories, Inc.; and the remaining Centers, IRIA, NTIAC, CPIA, TEPIAC, are operated respectively by ERIM at Ann Arbor, Michigan, SWRI at San Antonio, Texas, APL at Laurel, Maryland, and CINDAS at West Lafayette, Indiana. Geographically these centers are located across the whole country, with the largest concentration in the Midwest. While none of the IACs are operated by very large staffs, all have covenient access to large numbers of scientific and/or military experts, as needed for analysis in their pertinent technical fields. Some are actually located on Government R&D bases, e.g., AFWAL, RADC, NRL, Picatinny Arsenal; many others are in university communtities, e.g., Purdu, OSU, IIT, JHU and the University of Michigan. In addition, many of the Centers have access to top consultants in their fields through the various DoD committees and Professional Societies which they serve: e.g., JTCG/AS, JTCG/ME, IRIS, JANNAF and JSGCC. All of the above IACs are managed by a (contractor or Government) director supported by an appropriate permanent staff of five to thirty-five, plus part-time consultants as required, depending upon the size and scope of their data bases and the information "products" required by their users.

B-6.2 DATA BASES, GROWTH RATE AND PURGING

The IACs are basically similar in operation, but some significant variations are determined by the characteristics of their subject data bases. The interviews attempted to identify the major data base characterisitcs of the IACs, which might be pertinent to a proposed SURVIAC. Table B-3 lists the IACs interviewed in order (approximately) of technical relevance to a SURVIAC, and presents some of the characteristics, which influence the scope, size and mode of operation, such as types of source data, security classifications, number of documents, and growth rate. The technical relevance of six IACs to S/V was discussed in a previous section, and note that security controls are imposed on each of their data bases. Of the others, only CPIA is affected significantly by classified documents. However, (nearly) all the Centers face the other more common problems of data control; e.g., restrictions of Government "Official Use Only" and industry "Proprietary Rights," SURVIAC must accept the complications of data control including security regulations, but the operational precedents for responsive data dissemination without compromise are already established at CDIC, DASIAC, TACTEC, GACIAC, IRIA and CPIA.

Technical reports comprise the primary data base component for nearly all the Information Centers, including the proposed SURVIAC. Most of these are formal documents by Government and industry, test and/or evaluation agencies entered into the DTIC system (by AD number). Topical identifiers and descriptors are keyed to all the well-defined technologies, such that searches can be focused quickly for the benefit of users, directly or through the IAC network. Even for reports not entered in the DTIC system, similar search is

possible through similar data base systems. Unfortunately, the topical identifiers/descriptions of the DTIC system are not keyed to sort out the great variety of S/V topics in order to respond to the great variety of S/V users. Probably the first major problem to be faced in starting up a full-service SURVIAC will be to categorize the extensive DTIC holdings into meaningful S/V sub-sets, cross-referenced for efficient confident search to suit user needs. In general, it is believed that existing report abstracts will be meaningful to most S/V users, once they are properly categorized.

Partly of because of the nature of S/V information, and partly because of the above deficiency identified in DTIC identifiers, the S/V community is generally notorious for not entering their reports into the DTIC system. When they are entered they are frequently late, and keyed improperly and/or insufficiently for responsive retrieval. Before SURVIAC can serve its users with confidence, all S/V relevant documents inside or outside the DTIC bank must be centralized. Fortunately, some significant S/V sub-sets are already segregated: e.g., combat damage in CDIC; nuclear threat effects in DASIAC; detectability, guidance, etc. in GACIAC and IRIA; material properties in other Centers; hence the need for SURVIAC close coordination with those other IAC's.

Technical journals and proceedings comprise another data source, which is most significant to some IACs, but probably not to a SURVIAC. Symposia/conference proceedings (in general) are infrequent and usually readily accessible to interested users, especially those relevant to S/V. The process will be enhanced, if SURVIAC serves as a secretariat for S/V formal proceedings. While technical journals (and societies) are very important sources of data and state-of-the-art assessment in the well-defined science/engineering technologies (e.g. TEPIAC, MCIC), they are generally less adapted to disseminate input data for users in the disciplines like survivability and reliability. (Note that proceedings and journals are not significant data base items for CDIC, DASIAC, TACTEC and RAC.)

To maintain currency and complete responsiveness to users, SURVIAC must address relevant unpublished data, especially vulnerability/lethality test data. Precedents for collecting and disseminating such data exist in some IACs, notable CDIC, DASIAC, PLASTEC and RAC. While most IACs attempt to gather informal data at every opportunity, they avoid its formal incorporation into user data banks.

For the IACs visit, the number of data base documents (in-hard-copy, microfiche, etc.) ranged from 4,000 and 260,000, depending upon many factors; i.e., the age of the subject technology and/or of the Center, growth rate due to the supply and demand for data, and the perishable nature of the subject data, among others. (Data base estimation, specifically for S/V data and SURVIAC, is included in Appendix C.) Obviously, data-base document count does not completely represent an operational determinant for SURVIAC or the existing IACs. For instance, the 260,000 documents in TEPIAC and 130,000 in MCIC represent relatively small documents on specific material properties, which are the subject matter for these Centers. Similarly, the apparently small data bases (13,000 to 4,000) of NTIAC, RAC and CDIC are not representative for various reasons. Nondestructive testing (NTIAC) is a highly specialized area; reliability experience data (RAC) requires purging because it is intimatley related to specific hardware which becomes obsolete; the CDIC mission is

restricted to actual combat data, primarily. Note that GACIAC has already accumulated 27,000 documents in only five years of existence; conversely, CPIA has only 52,000 documents after thirty-six years. The remaining (6) centers are probably most representative (for SURVIAC estimate) with a data base range of 30,000 to 40,000 documents growing at the rate of 2,000 to 3,500 per year.

In summary, the data base characteristics of the existing IACs differ among each other, but collectively they provide precedents for the proposed SURVIAC–specifically in anticipated size, growth rate, control of unclassified or classified data, and integration with the DTIC/IAC network. Three potential problems appear unique to SURVIAC. Few precedents appear to exist for incorporating unpublished (S/V) data, which is included by definition (DOD INST 5100.45) within the purview of IACs and will be required to develop a responsive SURVIAC analytical capability. Non-DTIC documents must be centralized (and consolidated with DTIC documents) for a complete S/V data base. DTIC documents must be categorized to provide responsive retrieval for the variety of S/V users. None of these anticipations pose serious prblems, but they will require attention in the start-up of a full-service SURVIAC. As the source for nuclear S/V information, DASIAC is most similar to the intended SURVIAC for nonnuclear S/V information–operationally as well as technically.

B-6.3 PRODUCTS AND SERVICES INCLUDING DATA ANALYSIS

The facilities, staffing and funding requirements of the IACs are determined partly by the size and nature of the available (input) data base, and partly by the (output) products and services necessary to respond to the user community. The categories of services/products generally offered by the Centers are listed in Section B-3; the interviews served to identify variations in services among the IACs visited, and their potential relevance to the proposed SURVIAC.

Primarily all of the Centers provide data search service for qualified users–at least of their own data banks, and many of the Centers also have the terminals to search DTIC and other IACs for unrestricted references. Most of the visited Centers also have automated in-house facilities to search restricted data, but currently only the GACIAC and CPIA computers can process security classified data, and only GACIAC has a classified DTIC terminal. The common product is bibliographies, but some Centers (like IRIA and DACS) annotate the bibliographies, some (like DASIAC, TEPIAC, MPDC, and RAC) provide numerical data; ASIAC provides computer programs and some (like CPIA and PLASTEC) can provide extensive additional data analysis. The IACs generally communicate with the requestors to focus searches to specific needs.

Most IACs (with the exception of CDIC, TACTEC, and TEPIAC) publish conference proceedings, and some (DASIAC, GACIAC, IRIA, CPIA) act as Secretariat to arrange pertinent DoD committee conferences. All of the Centers (except CDIC, TACTEC and ASIAC) publish Handbooks, Data Books and/or Manuals, and for some (i.e., TEPIAC) these represent significant income. Nearly all publish Newsletters monthly or quarterly, and some publish Current Awareness Bulletins, Critical Reviews, and Technology Assessments. None

of the existing IACs are directly involved in the development and promulgation of Government specifications and standards. None of the DTIC/DLA Centers distribute technical reports generated by others (which is accomplished only from DTIC or NTIS). In addition to the above services/ publications, the IACs have varying capabilities for short-term and long-term special studies/tasks including data analysis in varying depths. Also in addition to their technical publications, it was emphasized in all the interviews that the IACs must advertise their available services continually in order to maintain user awareness of the available information/services.

For the S/V data user community, some of these functions are now sponsored or performed by the JTCG/ME and the JTCG/AS and its Design Criteria and Industry Interface Subgroup. A quarterly Newsletter, biennial symposium, and periodic workshops have been sponsored. A directory of S/V data users and generators in Government and industry is distributed. Short courses have been sponsored by the Navy and the Air Force. Joint Munitions Effectiveness Manuals (JMEMs) have been published and distributed by the JTCG/ME. Technology compendia have been developed and distributed. Technical reports are produced through the JTCGs and/or their participating agencies and distributed through DTIC and/ or other means. However, in spite of the Joint Service and other DoD activities, there is no centralized dissemination point for all S/V data, with the possible exception of DASIAC for the nuclear effects (only). It is believed these functions could be accomplished more effectively and more efficiently by a full-service SURVIAC, patterned from the pertinent features of the existing IACs. Whatever combination or form of services or products is required from SURVIAC, the interviews clearly indicated that the existing IACs have collectively established guiding precedents.

B-6.4 FACILITIES (AND SECURITY)

When compared to manufacturing, research, testing, and even to exclusive evaluation, the facilities required for Information Centers are extremely simple, as clearly demonstrated by the IACs visited. The essential requirements are: sufficient storage space for documents; working space for staff (and visitors); an efficient automated data handling system(s); effective and fast communications with other related data bases and with the generators of new data; effective publicity to make users aware of available information and services; and efficient means for timely dissemination of authoritative information and quick response to user questions. The major complication is data control, to protect not only "Proprietary Rights" and Government "Official Use Only" restrictions but also National Defense Security, at least at the levels of Confidential and Secret. The "security" complications which are reflected in facilities, time to respond and cost to operate, are clearly contrasted among the IACs with and without classified data bases. The necessary handicaps in protecting classified information were reiterated and emphasized in the IAC interviews (as well as by users who sometimes interpret it as unnecessary Government "red tape"). Unfortunately, by its very nature, most of the useful S/V information is classified.

The major characteristics of the facilities (and staffs) of the IACs visited are summarized in Table B-4. Some (like IRIA, TEPIAC, CPIA) are housed in modern separate buildings or

rented office complexes; some (like GACIAC, NTIAC, MCIC) share space with their parent organizations; others (CDIC, SVIC, PLASTEC, RAC, DACS) share old (but spacious) buildings on military installations. "Worker" space varied from three rooms (TACTEC) to ten or more rooms (CPIA, TEPIAC, MCIC); but note that neither of these extremes is typical of the existing IACs. The TACTEC mission is uniquely different from that of all other IACs, and the other three represent the largest and oldest IACs. At least six of the visited IACs utilize four to six rooms (including a small one-room library in some cases)—which is probably suitable for start-up of a SURVIAC.

Microfiche, microfilm, computer tapes and other modern techniques greatly reduce requirements for document storage. However, the interviewed IAC personnel emphasized the need to dedicate some space for "hard copy storage" especially for working references and visiting "customers"—hence the need for at least one room for document storage, in some cases as part of a minimum library. In addition, secure vaults or dedicated rooms for classified cabinets are required for some Centers with large holdings of classified documents, e.g., CDIC, DASIAC, GACIAC, IRIA (as well as the proposed SURVIAC). Location on a military base may provide some security advantages (e.g., for CDIC and ASIAC), although most of the existing Centers with classified data bases operate securely without military base protection (e.g., DASIAC, TACTEC, IRIA, CPIA, and other centers with small classified holdings).

Computer data storage/retrieval facilities and data transmission terminals are essential to modern information centers. Most IACs can search classified documents now; DASIAC will be able to soon; and SURVIAC will require such a capability. Many IACs have access to the extensive computer facilities of their parent organizations (and/or landlords). However, many also have their own dedicated in-house computers, partly for efficiency and economy, but mainly to hold and process controlled/restricted data, including classified data when necessary.

Communications and public relations facilities are essential to IAC operations, in order to maintain technical contracts with data generators in their fields, to keep the users aware of available information, to serve them responsively and to organize and conduct conferences. Finally a good "book-store" operation is also an essential IAC requirement, for reproduction, printing, mailing, collecting fees, etc. Most IACs rely on their parent organizations (e.g., IITRI, Battelle) for such services; others utilize Government facilities/services, and still others sub-contract for such support.

B-6.5 STAFFING

From Table B-4, note that permanent employees range from five to over twenty for the (16) IACs visited. However, excluding the typical large Centers (CPIA, TEPIAC, MCIC), most of them operate successfully with a core of five to eight. The minimum critical service requires at least a technical director and/or program manager, an assistant director/ administrator, a secretary, one (or more) computer/information specialist(s) and one (or more) technical specialist(s) for a well-defined homogenous subject field. A key function

(of one or more on the staff) is to act as point-of-contact (POC) for the users. From the interviews with the experienced directors/managers/assistants, it became clear that a viable IAC-operation is not conceivable with a staff less than five. Considering the start-up nature of SURVIAC and the present status of S/V information, a minimum of six appears more realistic. Fortunately, IACs can adapt to a variety of part-time support. Such flexibility is an essential feature of all existing IACs, but it is more critical to some depending upon the homogeneity of their subjects, and the demand for their services. All of the exisitng IACs utilize and depend upon part-time staff support for a variety of reasons and purposes. For operational support most centers share personnel from their parent organization. For technical support, some utilize academic staffs of associated and/or co-located universities; some have access to Government personnel support; some utilize "motivated committee associates"; some sub-contract (larger specialized assignments); some maintain files of consultants with appropriate unique expertise; some utilize all of the above means to accomplish whatever is required. In any case, whatever needs evolve in the proposed SURVIAC, precedents have already been set in one or more of the existing IACs.

For SURVIAC, it is anticipated that start-up will require additional information/computer specialist staffing in order to collect, centralize and reformat the existing data. The variety and status of the S/V data base will also require extensive technical (S/V) expertise to properly screen, categorize, reformat, purge, evaluate, and annotate the existing documents into a responsive information storage and retrieval system. The technical quality of this initial phase of operation is extremely critical to the future effectiveness/responsivenss of SURVIAC. It is estimated that SURVIAC will require a technical part-time staff of at least four.

Considerable variety exists within the broad heterogeneous S/V technology and its users: i.e., vulnerability and detectability; nuclear, nonnuclear and other threats; aerial, surface and other targets; attrition, mission-kill and repairability, processed and "raw", test and combat data; lethality, vulnerability and survivability analyses; model inputs and model outputs; specific system evaluations, etc. Even beyond the start-up phase, SURVIAC will require a variety of technical expertise in order to respond to the need for "data with analysis", clearly expressed by the users in the recent survey.

B-6.6 FUNDING

The range of annual budgets for the sixteeen IACs visited is approximately $100,000 to 1.3 million; but excluding TACTEC and the three largest Centers, the range is 300,000 to 600,000. The largest source of revenue is basic funding, ranging from 100,000 to 755,000 for all the Centers, but from 240,000 to 350,000 for the typical Centers. (see Table B-5). The second largest source of revenue for most of the Centers is "Special Studies", for Government agencies by MIPR and for industrial firms by Purchase Order, which can amount to minor efforts or major tasks up to 500,000 annually. Many of the IACs also derive income from subscriptions/participation plans and/or from fees for searches/services and from sale of handbooks, data books, manuals and other products. In fact, the nine Centers sponsored by DTIC/DLA were generally required to recover approximately half of their

basic support from charges for services rendered. IAC services are nominally "free" to individual Government agencies, but some IACs (like IRIA, GACIAC, CPIA) recover such costs from the parent military Services. The Services also cover the costs ncurred to support some efforts under contract. Industry payment plan options include annual subscriptions, deposit accounts with NTIS, blanket purchase agreements or MIPRs, among others; but many IAC services are free to users.

Subscription "packages" range from $300 to $5,000 per year. Without subscriptions, bibliography search fees range from $40 to $80 per hour, with minima of $40 to $250 per search. Document prices vary with types of document and subject material: e.g., $8 to $10 each for (IAC-generated) reviews and other (simple) publications, and $45 to $500 each for comprehensive handbooks.

Service/product charge systems are controversial, although most users find them economical for the services rendered, if they are timely and responsive. Frequently the need is urgent, and the user has neither the time, expertise, nor the awareness of document locations. In the recent survey of S/V information users, a majority (63%) said "nominal fees selected services would not limit SURVIAC use, but 26% said that it would, and others were undecided pending definition of "nominal fees". While the smaller firms were concerned about prohibitive charges, most others were more concerned about processing "red tape" than actual cost.

The best justification for charges is the motivation to the Centers to strive for more data, more customers and better service; thereby improving the quality and the dissemination of the information. Mixed opinions were reported also by the IAC Directors which were interviewed. A few are satisfied with their current operations with such incentives; some felt they had clear evidence that usage of their IAC dropped when fee systems were implemented; others felt that charges became unmanageable, especially when superimposed on other requirements such as need-to-know, security clearance, etc.; still others felt that fees particularly inhibited quick-response inquiries from the users and/or caused disproportionate uneconomical bookkeeping. Definitely, the revenue from subscriptions, service charges and product fees will not support IAC costs, nor, does it appear proportional to the burden imposed upon the IACs; however, the intangible benefits may justify such modes of operation and/or may help justification of Government funding support in "tight budget years". In any case, whatever is required or desired for SURVIAC, it probably has already been tried by one or more of the existing IACs.

The major operational costs of IACs are labor and overhead (for a staff of six or more), and computer costs depending upon the type of available facilities. Other potentially significant costs essential to information dissemination, are printing, mailing and other communications, depending upon what is furnished by the sponsor and/or parent organization. Some IACs are able to use Government printing and/or mail franking privileges. For the large mailing lists involved and/or the handling of typical classified envelopes, mail costs reach $20,000 per year for some IACs.

In summary, the experience of the other IACs indicates that the proposed SURVIAC will require an annual budget on the order of $800,000 almost exclusively from basic

funding. Other supplementary income will not exist during start-up of the Center until it is recognized and accepted by the users as a viable responsive source of S/V information.

B-6.7 OPERATIONAL RELEVANCE SUMMARY

Directors/managers/assistants of sixteen selected IACs were visited and interviewed, including nine sponsored and partly supported DTIC/DLA. Ranging in age for 2 to 36 years, collectively they offer ample experience in every aspect of information collection, processing and dissemination, including precedents for any operational features required or desirable for SURVIAC. Except for the source of basic funding, the service-sponsored Centers are fundamentally most similar to the DTIC IACs. All IACs are technically monitored by appropriate Government agencies, but all (except SVIC and PLASTEC) are operated by contractors, with technical back-up by universities and/or military R&D establishments. Six of these IACs are located on military bases.

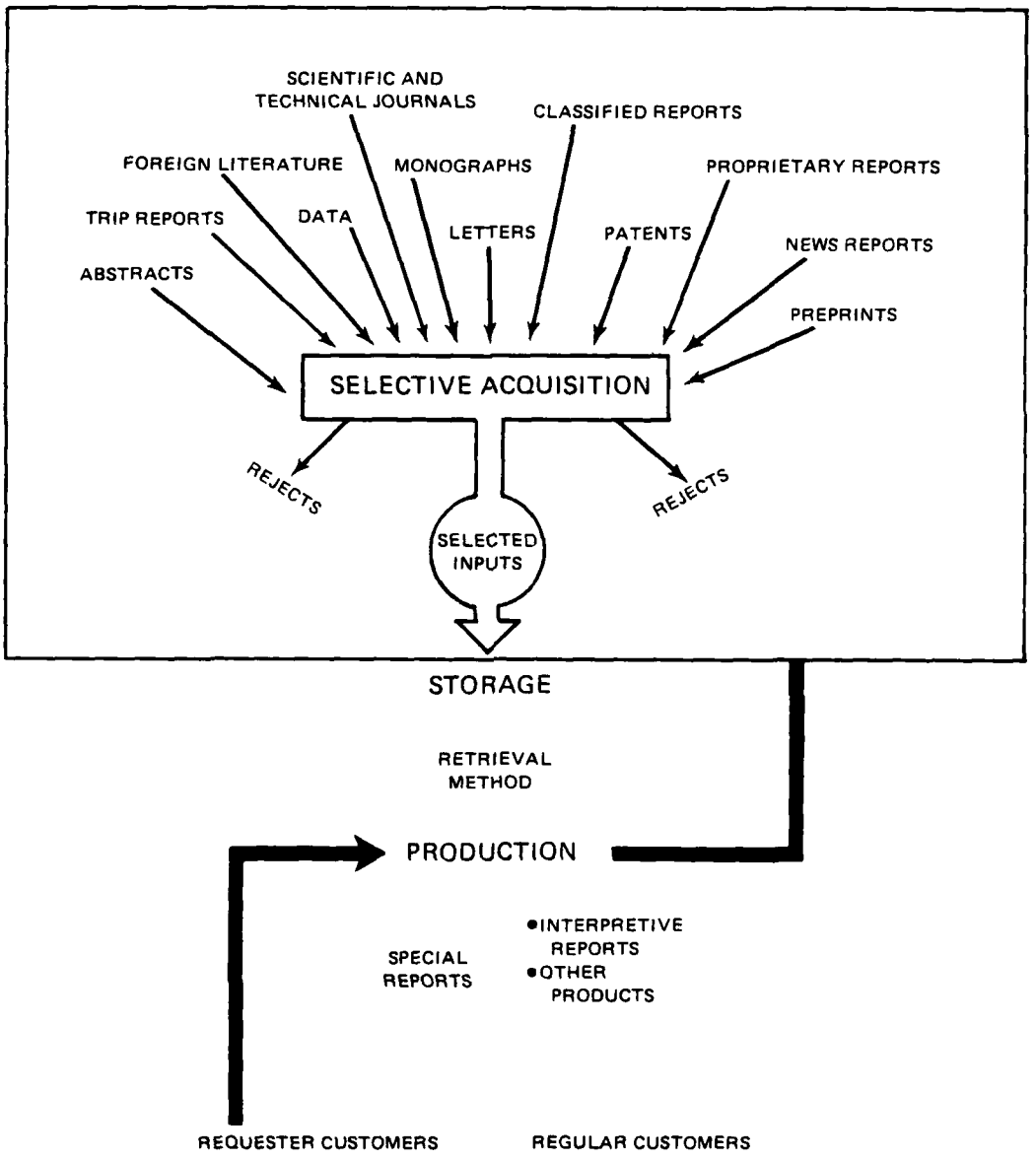
Only six of the visited Centers are involved with "security classified" documents, as anticipated for SURVIAC. All of the IACs can search DTIC via computer terminal, but the current DTIC identifiers/descriptors are not adequately keyed to the variety of S/V topics, nor does the DTIC system include all known S/V document sources. Most IACs work from a data base of 30,000 to 40,000 documents, growing at the rate of 2,000 to 3,500 per year—which is also anticipated for the proposed SURVIAC. Few of the existing IACs handle unpublished data, which is a requirement anticipated for a full-service SURVIAC. Of the Centers visited, DASIAC is most similar to the intended SURVIAC, except that its mission is limited to nuclear S/V.

The collective IACs (except TACTEC) provide precedents for all the common IAC products/services with variations to suit their technologies and their users. The primary services are searches and bibliographies, including annotated bibliographies and some numeric data. They publish Newsletters Current Awareness Bulletins, Critical State-of-the-art Reviews and Technology Assessments, Manuals and Handbooks, but not Specs and Standards, and no duplication of (outside) source documents except by DTIC. They publish proceedings and arrange conferences and serve as secretariats for Joint Service Committees. They have varying capabilities for special studies including data analysis in varying depths. They publicize their data holdings and capabilities for community awareness.

Required facilities are relatively simple except for the complications of protecting restricted and classified data—i.e., worker space, document storage space, a modern data retrieval system(s), communications, and a "book store".

Essential staffs comprise five or more, including information processing technicians and technical expertise in the subject field, with a permanent core and necessary part-time support, including specialty experts.

From the IACs similar to the anticipated SURVIAC, the required annual budget appears to be approximately $400,000—with about $300,000 in basic support, supplemented by charges to users for services rendered, as subscriptions, and/or fees for searches, data anlaysis and special studies.



THE PRIMARY FUNCTIONS OF SCIENTIFIC INFORMATION CENTERS

Figure B-1.

DEPARTMENT OF THE ARMY
HEADQUARTERS UNITED STATES ARMY
MATERIEL DEVELOPMENT AND READINESS COMMAND
5001 EISENHOWER AVE., ALEXANDRIA, VA 22333

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE LOGISTICS COMMAND
WRIGHT PATTERSON AFB, OHIO 45433

DEPARTMENT OF THE NAVY
HEADQUARTERS NAVAL MATERIAL COMMAND
WASHINGTON DC 20360

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE SYSTEM COMMAND
ANDREWS AFB, WASHINGTON DC 20334

JOINT DARCOM/NMC/AFLC/AFSC COMMANDERS
JOINT TECHNICAL COORDINATING GROUP ON AIRCRAFT SURVIVABILITY
NAVAL AIR SYSTEMS COMMAND
DEPARTMENT OF THE NAVY
WASHINGTON, D.C. 20361

Refer to:
5164J:DBA
13 Apr 1982

From: Chairman, Joint Technical Coordinating Group on Aircraft Survivability (JTCG/AS)
To: Distribution

Subj: Information and Analysis Center (IAC) Survey for Potential Application to Survivability/Vulnerability Information

1. The Joint Technical Coordinating Groups on Aircraft Survivability and Munitions Effectiveness (JTCG/AS and JTCG/ME) are investigating the need for and suitability of the IAC concept for nonnuclear survivability/vulnerability information. One important aspect of this investigation is a survey of existing IACs in order to establish their potential topical and operational commonality with survivability/vulnerability information.

2. To accomplish this we have requested the assistance of recognized survivability/vulnerability consultants to accumulate required data, including visits to IACs during April and May 1982. Any assistance you can provide these representatives will be deeply appreciated. To expedite the survey you will be contacted directly by one of the following:

Mr. R.A. Horton
Mr. J.B. Foulk
Mr. R.G. Bernier
Mr. D.W. Mowrer

3. Thank you in advance for your cooperation which is essential to determine the need and suitability of an IAC for this type of information.

Dale B. Atkinson

Dale B. Atkinson

Figure B-2.

TABLE B-1. IAC Visits.

Center (Contractor)	Interviewers	Date 1982	Interviewees	Technical Scope
1. DTIC/DLA	R. G. Bernier R. A. Horton	Mar. 31	J. Pendergast, Prog. Mngr. B. McCabe	All DoD Information
2. NTIAC[a] (SWRI)	J. B. Foulk D. W. Mowrer	Mar. 31	Dr. Richard Smith, Director	Non-Destructive Testing
3. PLACTEC/AARADCO	J. B. Foulk	Apr. 15	H. E. Pebly, Director	Plastics
4. IRIA[a] (ERIM)	R. G. Bernier D. W. Mowrer	Apr. 19	Dr. G. J. Zizzi, Director M. Denecke, P.O.C.	Infra-red
5. GACIAC[a] (IITRI)	R. G. Bernier D. W. Mowrer	Apr. 20	C. W. Smoots, Director	Gudiance and Control
6. TEPIAC[a] (CINDAS)	R. G. Bernier D. W. Mowrer	Apr. 21	Dr. C. Y. Ho, Director W. H. Shafer, Asst. Dir.	Therm. Phys. and Electronics Prop.
7. TACTEC (BMI)	R. G. Bernier D. W. Mowrer	Apr. 22/23	J. T. Brown, Director E. Westbrook, P.O.C.	Tactical Technology
7a. Surv. Mod Respository			R. Broderson, Manager	Surv./Lethality Models
8. MCIC[a] (BMI)	R. G. Bernier	Apr. 22/23	Dr. H. Mindlin, Director	Metals and Ceramics
9. MPDC[a] (BMI)	D. W. Mowrer	Apr. 22/23	H. Hucek, P.O.C.	Mechanical Properties
10. SVIC/NRL	R. G. Bernier J. B. Foulk D. W. Mowrer	Apr. 30 Apr. 30 Apr. 30	H. C. Pusey, Director D. G. Showalter, P.O.C. Dr. R. Volin, P.O.C.	Shock and Vibration

TABLE B-1. IAC Visits. (Contd.)

Center (Contractor)	Interviewers	Date 1982	Interviewees	Technical Scope
11. CPIA[d] (APL)	R. G. Bernier	May 5	A. V. Jensen, P.O.C. T. M. Gilliland, P.O.C.	Chemical Propulsion
12. DASIAC (K-T)	J. B. Foulk	May 7	W. W. Chan, Director	Nuclear Effects
13. MMCIAC[d] (K-T)	J. B. Foulk	May 7	L. A. Gonzalez, Director	Metal Matrix Composites
14. RAC[d] (IITRI)	R. G. Bernier R. A. Horton	May 11	Dr. H. A. Lauffenburger, Director	Reliability
15. DACS (IITRI)	R. G. Bernier R. A. Horton	May 11	S. A. Gloss-Soler, P.O.C. J. Palaimo, USAF, Tech. Monitor	Software
16. ASIAC/AFWAL (ALI)	J. B. Foulk	May 11	G. R. Neggard, P.E.	Aerospace Structures
17. CDIC/JTCG (B-A)	J. B. Foulk	May 12	G. Priestley, Manager G. Streets, USAF, Tech. Monitor	Combat Damage

[d] Affiliated with DTIC

TABLE B-2. Affiliations of the IACs Interviewed.

IAC	Sponsor	Tech. Monitor/ Prog. Mngr.	Operating Contractor	Technical/Scientific Analysis Back-up
1. CDIC	JTCG/AS JTCG/ME	FDL AFWAL/FIES	Booz-Allen and Hamilton	USAF Wright Aeronautical Laboratories
2. DASIAC	DNA	STTI	Kaman-Tempo (formerly GE TEMPO)	DNA/DoD Personnel Kaman Sciences, Inc.
3. TACTEC	DARPA	DARPA	Battelle - Columbus Laboratories	Battelle Memorial Institute and Ohio State University
4. GACIAC[a]	DTCI/DLA	MICOM	IIT Research Institute (IITRI)	Electronics and Other Divisions of IIT
5. IRIA[a]	DTIC/DLA	ONR	Environmental Research Institute of Michigan (ERIM)	ERIM (formerly Willow Run Laboratories of University of Michigan)
6. ASIAC	USAFWAL	FDL	Anamet Laboratories, Inc.	USAF Wright Aeronautical Laboratories
7. NTIAC[a]	DTIC/DLA	AMMRC	Southwest Research Institute	SWRI
8. SVIC	USN	NMC	Government - US Naval Research Laboratory (NRL)	U.S. Naval Research Laboratory
9. CPIA[a]	DTIC/DLA	NAVSEA JANNAF	Applied Physics Laboratory (APL)	The Johns Hopkins Univeristy (JHU)

[a]Affiliated with DTIC

TABLE B-2. Affiliations of the IACs Interviewed. (Contd.)

IAC	Sponsor	Tech. Monitor/ Prog. Mngr.	Operating Contractor	Technical/Scientific Analysis Back-up
10. TECPIAC[a]	DTIC/DLA	AMMRC	Center for Information and Numerical Data Analysis and Synthesis (CINDAS)	CINDAS and Purdue University
11. PLASTEC	DARCOM	DARCOM	(Government US Army Armament Research and Development Command)	Consultants
12. MMCIA[a]	DTIC/DLA	NSWC	Kaman-Tempo	Kaman Sciences, Inc.
13. MCIC[a]	DTIC/DLA	AMMRC	Battelle-Columbus Laboratories	Battelle Memorial Institute of Ohio State Univeristy
14. MPDC[a]	DTIC/DLA	AMMRC	Battelle-Columbus Laboratories	Battelle Memorial Institute of Ohio State University
15. RAC[a]	DTIC/DLA	RADC	IIT Research Institute	IIT and USAF Rome Air Development Center
16. DACS	USAFRADC	RADC/ISIE	IIT Research Institute	IIT and USAF Rome Air Development Center

[a]Affiliated with DTIC

TABLE B-3. IAC Data Base Major Characteristics.

IAC	S/V Tech. Relevance Rating	Security Classi-fication	Unpub-lished Data	Technical Reports DoD	Journals and Proceedings	IAC Age (Yrs.)	No. of Documents	Growth Rate Doc/Yr.	Need for Periodic Purging
1. CDIC	1	Yes	Yes	Yes	No	12	4,000	250	Yes
2. DASIAC	1	Yes	Yes	Yes	Minor	21	40,000	3,500	Yes
3. TACTEC	1	Yes	No	Yes	No	19	40,000	3,000	Yes
4. GACIAC	2	Yes	No	Yes	Yes	5	27,000	2,000	
5. IRIA	2	Yes	No	Yes	Yes	28	40,000		Yes
6. ASIAC	2	(5%)		Yes	Yes	10	35,000	3,000	
7. NTIAC	3	No	No	Yes	Yes		13,000	1,200	
8. SVIC	3	No	Little	Yes	Yes	35	30,000	3,000	Yes
9. CPIA	3	Yes	Little	Yes	Yes	36	52,000	1,400	
10. TEPIAC	3	No	Some		(350)	21	260,000	10,000	
11. PLASTEC	3	No	Yes	Yes	Yes	20	30,000		Yes
12. MMCIAC	3				Yes	2			
13. MCIC	3	No	No	Yes	Yes	27	130,000	3,600	
14. MPDC	3	No				22			
15. RAC	3	No	Yes	Yes	No	14	12,000	1,200	Yes
16. DACS	3					2			Yes

TABLE B-4. Facilities and Staffs in Existing IACs.

IAC	Classified	Computer Terminal		Space		Staff		
		DTIC	In-house	Work	Document storage	Permanent core	Part-time	Back-up (tech.)
1. CDIC	Yes		Yes	5 rooms	Vault (1400 ft^2)	4	1	AFWAL & ASD
2. DASIAC	Yes	Not yet	Yes		Vaults	5	25 (½ time)	Consultants and Sub-contracts
3. TACTEC	Yes	No	Yes	3 rooms	Yes	5	- - -	Battelle (and Sub-contracts
4. GACIAC[a]	Yes	Classified		5 rooms	Yes	5-6	- - -	IITRI
5. IRIA[a]	Yes	No	Yes	5 rooms	2 lg. rms.	7-8	- - -	ERIM (25-30)
6. ASIAC	(5%)		Yes			6-8	- - -	FDL
7. NTIAC[a]	No	Yes	Yes	5 rooms	1 room	5-6	- - -	SWRI (200)
8. SVIC	No	No	Yes	5 rooms	Basement	5	- - -	(Publication center)
9. CPIA[a]	Yes	Yes	Clas.	10 rooms		21	- - -	APL (and JANNAF)
10. TEPIAC[a]	No	No	Yes	Whole bldg.	(Fiche)	13	- - -	CINDAS
11. PLASTEC	No	Yes	Yes	5-6 rooms (40 ft x 100 ft)	Yes	5	6	Consultants
12. MMCIAC[a]								
13. MCIC[a]	No	Yes		10 rooms	Large	10		Battelle (100)
14. MPDC[a]	No		N/A	(Included with MCIC)				
15. RAC[a]	No		Minor	1 lg. room		34	- - -	IITRI
16. DACS						6-7	- - -	IITRI

[a] Affiliated with DTIC

TABLE B-5. IAC Funding, Fees and Usage.

IAC	Annual total $K	Basic $K	Special studies/other $K	Industry use		Total usage (requests per year)	
				Subscriptions	Other	Direct to IAC	Through DTIC
1. CDIC	277	250	Minor	No	Searches-no products	180	No
2. DASIAC	---	---	MIPRS	No	By purchase order (no charge for most)	540	No
3. TACTEC	100+	100	Yes	No	Main effort is special studies	N/A	N/A
4. GACIAC[a]	∿500+	300 (+100)G	10-100	Yes	Subscription ($300-$500/yr.)		1500
5. IRIA[a]	∿500	350 (+120)S	120	Yes	Subscription ($350-$500/yr.) (incl. free services)	---	---
6. ASIAC	450	350	Yes	No	Searches; structural analysis; computer programs	---	---
7. NTIAC[a]	∿400	240	80	No	Special studies (2-25K) 6/yr; searches/prod. $10-$100 ea.	93	4800
8. SVIC	600	250	MIPRS	Yes	Subscription $1000/yr.; searches $80/hr.; other free	210	No
9. CPIA[a]	1000	480 (469)S	179	Yes	Searches $40/hr; Handbooks and Pubs. $8to $500 each	300	
10. TEPIAC[a]		435	Yes	No	Searches $40/hr; Handbooks $45 to $400 each	730	No
11. PLASTEC	∿500		Yes	Yes	Searches $250/hr; special studies $50/hr (thru NTIS)	---	---

TABLE B-5. IAC Funding, Fees and Usage. (Contd.)

IAC	Annual total $K	Basic $K	Special studies/other $K	Industry use		Total usage (requests per year)	
				Subscriptions	Other	Direct to IAC	Through DTIC
12. MMCIAC[a]	350+	300	Yes	No	Spec. studies and pubs.	100	
13. MCIC[a]	~1300+	755	482	No	Product Fees for schools, handbooks, proceedings, SOA review, pubs., etc.	280	75
14. MPDC[a]	---	---	Yes	---	---	---	---
15. RAC[a]	850	500	350	Yes	Searches, handbooks products	---	No
16. DACS	---	---	Yes	Yes	Participation plans	---	---

[a] Affilated with DTIC

Appendix C

PRESENT STATUS OF SURVIVABILITY/VULNERABILITY (S/V) INFORMATION AND MEANS OF DISSEMINATION TO DEFINE THE DESIRED DATA BASE AND SCOPE OF A PROPOSED INFORMATION ANALYSIS CENTER–SURVIAC

APPENDIX C CONTENTS

C-1.0 INTRODUCTION

Survivability/vulnerability requirements exist implicitly and explicitly for all DoD equipment. By nature, some aspect of S/V is involved in practically every phase of design, development, evaluation and employment of military hardware. Data and methodology for S/V quantification have been accumulating for at least forty years; which by itself might justify the need for a specialized information center. Because of rapid advancements in modern technology, new information is becoming available at an ever increasing rate. However, the strongest justification for a full-service SURVIAC is the ever increasing variety of S/V data, as well as its uses and users, which compound the dissemination problems.

SURVIAC is not the first attempt to solve this chronic problem. In fact, the formation of the Joint Technical Coordinating Groups for Munitions Effectiveness (JTCG/ME) and for Aircraft Survivability (JTCG/AS), was primarily motivated by the needs of users for timely access to authoritative information in readily usable form. Many other attempts by DoD, by single services and some of their agencies have been only partially successful. The IAC approach definitely has succeeded with the exploding data bases of other emerging (but well-defined) modern technologies. SURVIAC success depends upon its adaptability to the variety (as well as the quantity) of technical information and its uses within the S/V discipline.

To some extent, the size and scope of the proposed Center will depend upon the number of available documents which might be considered relevant to S/V quantification. Theoretically, all S/V documents are available to (qualified) users from DTIC, NTIS (and a few other uncentralized sources). Acutally the difficulties in locating, identifying and obtaining useful data were confirmed by the responses of 718 Government/industry users in the recent survey (Appendix A). Some estimates of S/V data base size are presented herein. However, the current inability to define the S/V Data Base precisely or completely is further confirmation of the need for a SURVIAC, which can find the right data and deliver it to the right user at the right time. Accordingly, this Appendix attempts to describe major SURIVAC considerations in the delineation of the multi-parameter S/V discipline, and the numerous subspecialty information uses/users.

C-1.1 THE S/V DISCIPLINE AND TYPES OF DATA

The S/V discipline involves the quantification of weapon lethality and target vulnerability for all combinations of targets and threats. Targets may include all types of aircraft, missiles, ground vehicles, ships, space vehicles, personnel, ground weapons, facilities, structures, etc. Threat types may include nuclear, nonnuclear, directed energy, chemical/biological, (and some similar natural/environmental phenomena) damage/degradation mechanisms by weapons including consequent crash/post-crash. Threats may also inlcude some electromagnetic and other detection/counter-detection mechanisms.

Quantification of nuclear lethality/vulnerability/survivability has developed from available *nuclear* effects testing and analysis; e.g., blast, thermal and radiation, direct and indirect

effects. The *chemical/biological* threat primarily affects S/V though personnel incapacitation, hence its quantification and influence on the design of military equipment differs considerably from that of the other threats. Recently, concern for high-energy lasers (HEL) and other *Directed-energy-threats* also has increased. Fortunately its quantification methodology is parallel and similar to that for some conventional nonnuclear threats, but a critical new body of damage data is emerging. The quantification of lethality/vulnerability of many types of targets against *conventional nonnuclear* threats is highly developed, and it encompasses a variety of weapons (guns and missile), projectiles (bullets, shell fragments, etc.) and damage mechanisms (blast, fire, penetration, etc.). Many vulnerability reduction techniques against specific projectiles and against general damage mechanisms are also developed and documented, including numerous applications.

The general approach for vulnerability quantification of targets is synthesis of component/subsystem/system lethality/vulnerability to given projectiles from accumulated data (ballisitc firings, controlled damage tests and battle damage), based on the principle that different targets comprise similar basic structural/functional components. Suitable methodology is highly developed for many combinations of targets and (nonnuclear) threats. In general, these methods require the following types of input: target description, definition of relevant types of kill (attrition or functional degradation), and relevant component/subsystem damage data. This methodology quantifies vulnerability; i.e., "kill given a hit". In order to quantify lethality/survivability (i.e., overall probability of kill) for one-on-one encounters, it is then necessary to combine probabilities of detection, acquisition, hit, etc. which are peculiar to various types of weapons (e.g., guns, warheads, radar-directed AAA, guided missiles, direct energy, etc.). Some comparisons of the survivability and/or weapons effectiveness are possible at this level. Others require higher level quantifications including additional parameters of performance, tactics, strategy, cost, etc. Hence, quantification within the S/V discipline includes a variety of highly developed computerized methodologies/models, many of which are not completely standardized.

The breadth and variety of the S/V discipline is apparent even from the above cursory summary. Furthermore, it is essential to integrate S/V with the essential performance requirements of military equipment, and the other relevant design disciplines (e.g., safety, reliability, maintainability, repairability, etc.). While some key elements of S/V scope are already organized, the need for centralization and integration of information appears critical and urgent.

C-1.2 S/V INFORMATION USERS AND USEFUL FORMS

Because of the permeating nature of the discipline and the requirements for its integration, it can be said that the S/V user community encompassses all DoD agencies and the industry that produces military equipment. The recent questionaire survey (Appendix A) was addressed to over 4,000 (from the mailing lists of the JTCG/AS Newsletter and the ADPA Ballistics and Vulnerability Division). Over 700 responded (half Government and half industry), with 92% confirming the need for a "center of information on S/V data, analysis and technology". Government agencies and the "study/analysis" contractors that

support them, all require integrated, standardized S/V quantification, primarily to measure and compare cost and system effectiveness for decisions in selecting competitive equipment. Prime manufacturers and sub-contractors require similar S/V quantification primarily to evaluate competitive trade-offs in their designs and developments of effective (and competitive) equipment. None of the elements in either the Government or the industry sectors have complete capability to generate all the S/V data and methods that they require. For many, it is difficult even to maintain awareness of all the S/V data or methodology that can have major critical impact upon their decisions/products. A variety of S/V technology, methodology and input damage data has been generated over the past forty years, by many different Government and industry activities. At least 110 agencies are still in existence for aircraft S/V alone (according to the "JTCG/AS Directory of Aircraft Survivability Specialist and their Affiliations"). The DoD procurement process requires ready access to available information for timely proposals in response to competitive RFPs. Very few companies/agencies are able to maintain permanent teams with S/V capability; none are able to keep up with the variety of data and methodology. As a result, the need exists for a central focal point to disseminate the latest information in readily usable form. In the recent user survey, 84% of the responders voiced a preference for "Data with Analysis". Hence, the uses and users of S/V are as varied as the discipline and the specialized information it covers. Timely integration of S/V considerations requires an efficient responsive centralized focal point, technically qualified to quickly identify and adapt relevant information to a large variety of specific problems.

C-1.3 S/V INFORMATION SOURCES

Most of the available S/V data have been generated by specialized R&D agencies (mostly Government) with specialized expertise and/or test facilities. A few of the constant users (with permanent S/V teams) are able to keep up in their technical fields through direct personal contact with the generators of relevant data in one or more agencies of the three services. Most Government agencies are restricted in distributing their technical reports outside the DoD, but most documents are entered (by AD number) into the DTIC system, which together with NTIS is the primary source for a large majority of the users. Unfortunately, such large information systems are not designed or intended for quick or complete retrieval in all the highly specialized technical areas. Some specialized segments of S/V information have been organized by designated IACs: e.g., DASIAC (nuclear effects), IRIA (infrared detection and countermeasures), GACIAC (guidance and control), but with the possible exception of DASIAC, these Centers are not primarily oriented for lethality/survivability effectiveness evaluation. The Joint Munitions Effectiveness Manuals (JMEMs) are used widely, but they require updating for some applications especially against new "foreign" targets. Efforts/reports by the JTCG/ME, JTCG/AS and other tri-Service groups/subgroups/committees are intended to fill R&D "gaps" for users, but none of them are staffed, organized or intended for responsiveness to specific problems. The Combat Damage Information Center (CDIC) contains large collections of operational "real-life" data, but generally not in readily usable form for use in S/V evaluations. In some technical areas (e.g., the directed energy and chemical biological) activity is localized, but dissemination of information is necessarily restricted by "national security". The "open literature" sources,

i.e., industry publications, technical society journals and proceedings, trade magazines, etc., contribute very little quantitative information which is directly applicable (to S/V). Handbooks, Military Standards and Specificaions are easy to acquire, and helpful, but insufficient by themselves. Symposia, seminars, and workshops also serve to disseminate information to some or all users, but singly or collectively, none of them meet the fundamental needs of users in order to properly integrate S/V discipline into the design and/or evaluation of military equipment.

C-1.4 PRESENT PROBLEMS OF DISSEMINATING (S/V) INFORMATION

The main problem to the user is the lack of a central focal point, from which to obtain comprehensive authoritative information in readily usable form. Encouraging exceptions are DASIAC for nuclear S/V, and (soon) the new AFWAL/JTCG Model Repository. The original sources of S/V data and methodology are too numerous and varied to be reached by most users.

Large technical document distribution centers (DTIC, NTIS) were not intended for the complete retrieval of specialized information, for which the IACs have been developed. More specifically, the DTIC system does not contain enough unique identifier and descriptor retrieval terms to cover the S/V discipline completely, including all its relevant subsets. It is extremely difficult for a large information center like DTIC to devise definitive search strategies. Invariably, a search will identify many irrelevant documents and miss many others known to contain pertinent S/V data. Partly, this problem arises because authors frequently do not index sufficient S/V terms in the technical reports they submit to DTIC, even though the S/V terminology is defined (Reference: MIL-STD-2089 (21 July 1981) Aircraft Nonnuclear Survivability Terms.) Another part of the problem arises with "system evaluation" documents, which use significant S/V data inputs that are overshadowed by the primary purpose of the documents. Furthermore, such documents tend to be restricted for official use, even though the S/V input they contain is frequently releasable for other uses/users. Finally, another problem exists in that not all S/V relevant documents are entered into the DTIC/NTIS systems.

In the recent S/V user survey (Appendix A), the following problems were confirmed by the responders: (1) unavailability and/or inaccessibility to needed information (checked by 70%); (2) unawareness of available data and methodologies (56%); (3) inconvenient/incomplete form of information (38%); (4) information not oriented/slanted to needs (37%); and (5) poor quality (unreliable, dated, etc.) information (27%).

The main purpose of this Appendix C is to estimate the potential size of the S/V data base for a proposed SURVIAC. However, it is apparent that its scope is intrinsically related to: the nature of the S/V discipline, the variety of data it comprises, the nature of the users, and the form of data they require, as well as the sources of data and their present problems in responsiveness.

C-2.0 PRESENT DATA BASE ESTIMATES

All S/V relevant documents in DTIC/NTIS and other data banks must be identified before they can be categorized, screened and purged for current relevance to future uses/users. The following S/V "document counts" were obtained from four types of sources: IAC holdings, published bibliographies, unpublished (local) bibliographies, and recent searches of DTIC and/or NTIS. Unfortunately none of them are complete, most them overlap, and only a few of the sources categorize S/V data into useful subsets of S/V information variations.

The data banks of the exising IACs range nominally from 4,000 to 260,000 documents, but more typically from 30,000 to 40,000 (see Appendix B). Typical growth rates are 2,000 to 3,500 documents per year. For the centers that overlap the S/V discipline, document estimates are as follows:

CDIC	4,000 plus 250/year
DASIAC	40,000 plus 3,5000/year
TACTEC	40,000 plus 3,000/year
GACIAC	27,000 plus 2,000/year
IRIA	4,000 (growth rate unknown)
ASIAC	35,000 plus 3,000/year

For CDIC and DASIAC, probably all the documents are at least indirectly relevant to S/V, whether or not they are in a useful form for S/V users. For any of the above Centers, it was not possible to determine the number of documents which are directly relevant to a proposed SURVIAC; furthermore, it is known that most of the above holdings overlap each other. A crude upper bound estimate is probably 30,000 documents to be screened by a new SURVIAC for analysis and/or possible retention.

Published bibliographies of definitely relevant documents include the following:

a. JTCG/AS-80-B-004 (August 80) lists 107 reports published by the JTCG/AS or its participating (Government) agencies—including 87 with AD numbers and 20 without (i.e., not entered into DTIC or NTIS).

b. 61JTCG/ME-1-2 (April 81) lists 272 documents directly relevant to some segments of S/V and not entered into DTIC/NTIS at the present time.

c. Over 400 documents are cited as references in the Military Handbook for Aircraft Nonnuclear Survivability/Vulnerability, for various subtopics, mostly with AD numbers.

Most of the agencies primarily involved with the generation and/or use of S/V data maintain bibliographies "tailored" primarily for their own use, (but sometimes published

periodically, or distributed informally to qualified requestors). For instance, a recent Bibliography at the U.S. Army Ballistic Research Laboratory (AARADCOM) identifies approximately 35 S/V sub-topics with slightly over 1900 references, but many of the references overlap sub-topics, such that the total relevant documents are less than 1900. The sub-topics include testing, methodology, applications, and various combinations of components and (ballisitic) threats.

Searches of DTIC were obtained (through NTIS, CDIC, and DASIAC), and these indicate much larger populations of S/V documents, depending upon "search strategy". One typical search (requested by DASIAC) identified the following references: 7,591 aircraft-related technical reports and 3,772 aircraft component-related reports in addition to 2,187 on-going Work-Units, including 878 from "primary" references. (Search for all aircraft-related references produced computer overload.) Another recent search (requested by CDIC) from NTIS identified 35,157 aircraft-related reports and 1,550 S/V-related reported, but only 294 related to S/V of aircraft (and only 3 explicit mentions of nonnuclear S/V of aircraft). More such documents are known to exist, although most are classified (Confidential or Secret), hence excluded from NTIS. It is also apparent that more documents could be found through other "search strategies" and more persistent searching. However, such a process is obviously not responsive and is discouraging to users.

Against the nuclear threat, similar search indicates 87,000 nuclear/atomic reports, but when combined with the (above) 35,000 aircraft/airplane reports and the (above) 1,550 S/V-related reports, the "finds" reduce to a similar very small number. Fortunately, a more meaningful search is possible (for qualified users) through DASIAC, because topics and sub-topics relevant to S/V have been categorized by this Center for nuclear effects. Unfortunately, similar capability to search (and find) nonnuclear effects data is not currently available to users. SURVIAC would eliminate this deficiency.

Still another search, strictly for "classified" references, revealed 352 documents (on nonnuclear S/V) for 1969 to 1980; which suggests an approximate total of 1,400 S/V relevant documents. In another DTIC search, 16,150 S/V-relevant "finds" included 3,811 aircraft S/V-relevant finds. It should be emphasized, however, that many other identifier-description keys are available in the (DTIC) system, such that by using various strategies it is possible to find many reports, most relevant to many S/V specialties/targets/effects. Unfortunately, users find the system difficult to use, with no central authority to certify that search in any given subject is exhaustive.

Still another search by decade was aimed at estimating the growth rate of aircraft S/V documents in DTIC, with the following indication:

Prior to January 1950:	28 reports
1950 to 1960:	549 reports
1960 to 1970:	1,196 reports
1970 to 1982:	2,003 reports

Assuming that the selected aircraft S/V reports are representative, the indicated current growth rate is about 80 reports per year and increasing. Apparently the selected sub-topic(s)

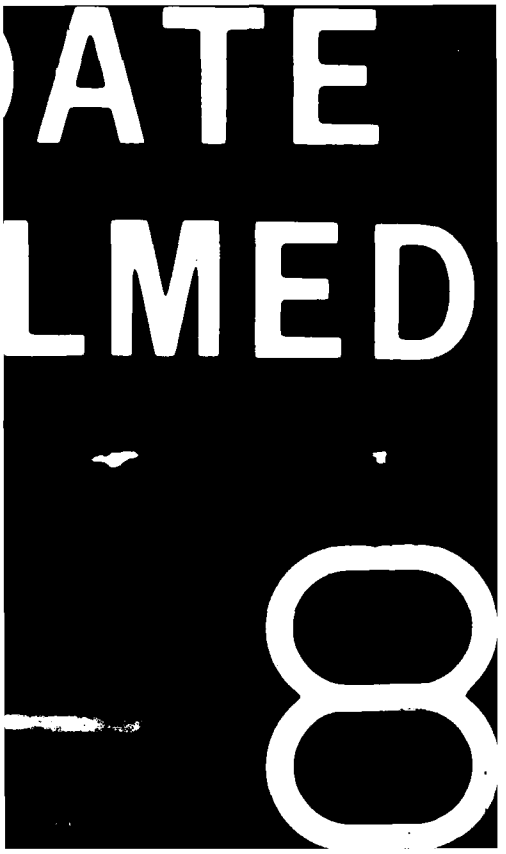
do not include all relevant reports, but the above growth rate of 2% per year may indicate a most conservative anticipation (other IAC document populations are increasing at the rate of 5 to 12% per year).

C-3.0 SUMMARY

Users of S/V information need a full-service center which can quickly provide all the important data that is relevant to any sub-set of the S/V discipline. The first step of a proposed SURVIAC is to identify all S/V documents and other information in existence, before they can be categorized, organized, purged and updated. NTIS is the primary source of R&D information available to industry, but it is not responsive, because by nature most useful S/V information is restricted and/or classified. Most users also have access to DTIC, which is restricted and/or classified. Most users also have access to DTIC, which is organized to serve researchers with sufficient background specialized expertise, motivation and time to "dig-out" what they need. But, the DTIC scope and purpose is too broad to provide authoritative summaries of specialized technical data; for which the Information Analysis Centers have been organized.

While DASIAC appears to cover nuclear S/V information, the other target threat combinations presently are not organized for responsive dissemination to the users. In fact, it is even difficult to identify precisely how many existing documents are relevant to S/V. Estimates indicate an upper bound of about 30,000, but useful documents may degenerate to less than 10,000.

In any case, the first task of a proposed SURVIAC will be to identify and locate the S/V documents in DTIC and elsewhere. Depending upon the planned scope and the priorities, definition of the data base will represent a significant start-up task of the proposed SURVIAC.


ATE
LMED
8